THE

FOUNDRY TRADE JOURNAL

WITH WHICH IS INCORPORATED

THE IRON AND STEEL TRADES JOURNAL

VOL. 38. Thursday, February 16, 1928. No. 600.

PUBLISHED WEEKLY

Subscription Terms: 15s. per annum.
Foreign and Colonial, 17s. 6d. per annum.
All Subscriptions are payable in advance.

All Communications to be addressed to the Editor, or to the Publisher, as the case may be, of

THE FOUNDRY TRADE JOURNAL,
49, WELLINGTON STREET, LONDON, W.C.2.

Telephone: Gerrard 3951 (4 lines).
Telegraphic Address: "Zacatecas, Rand, London."

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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOCIATION.

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Foundry Technical Institute, Meek's Road, Falkirk (*Telephone* 332.)

Forthcoming Events.

FEBRUARY 17.

West of Scotland Iron and Steel Institute:—Ordinary meeting at Glasgow. "Engineering Tests for Cast Iron," Paper by J. G. Pearce.

FEBRUARY 18.

Swansea Technical College Metallurgical Society:—General meeting. "Further Experiments on the Annealing of Mild Steel Sheets," Paper by J. C. Godsell.

Co-ordinating Committee:—Joint meeting at Dudley. "Malleable Cast Iron," Paper by H. Field.

FEBRUARY 20-27.

Royal Society of Arts:—Cantor Lectures on "Fatigue Phenomena," by Herbert John Gough, M.B.E., B.Sc., Ph.D.

FEBRUARY 23.

Manchester Association of Engineers (Student Section):—Lecture by W. Jolley on "Foundry Work."

Institute of British Foundrymen.

FEBRUARY 24.

Scottish Branch (Paisley Section):—Ordinary meeting at the Paisley Technical College. "Aluminium and Non-ferrous Alloys," Paper by H. Williamson.

FEBRUARY 25.

Birmingham, Coventry and West Midlands Branch:—Ordinary meeting at Birmingham. "Some Foundry Considerations of Moulding Sand," Paper by A. Logan.

Newcastle Branch:—Ordinary meeting at Neville Hall. "A Talk on Cylinder Iron," Paper by F. J. Cook.

Obsolescence.

Several years ago one of Britain's best known industrial establishments was financially weak, and a new chairman was appointed, and from that date onwards true progress was made, the company now ranking high amongst the dividend-paying concerns. Those with inside knowledge ascribe the success to concentration on the question of obsolescence of plant and process. The new chairman insisted that any machine or process which was known to have been superseded to advantage in competing establishments should be figuratively placed on the debit side of the balance sheet.

Now at this time of the year last year's balance sheets are being presented by the auditors to the foundry directorates or owners, and we desire to draw attention to value of the plant figuring as an asset in the balance sheet, and to ask point-blank whether if this value has been ascertained by normally depreciating the purchase price, or by a similar process, it is not a fictitious figure? Is not the real value of a collection of plant either its secondhand, scrap, or a value determined by efficiency of the plant used by the most severe competitor? For instance, an equipment for making a line of castings which has been superseded by drop forgings should be written off to zero, unless it can economically be converted for the production of another but remunerative casting. Such plant as hand-operated jib-cranes, in nine cases out of ten, can safely be put on the debit side of a balance sheet.

The value of the buildings, too, should undergo similar treatment. They should be regarded from the point of view of economy in internal transport, upkeep, adequate heating, lighting, and ventilation. We insist that the position and the construction of some foundries are such that they are a veritable hindrance to production. We are quite aware that for some foundries this outlook would mean bankruptcy on paper, but we insist that such introspection as we have indicated should be continuous, and result in a mental outlook conducive of a better appreciation of the rational operation of a modern business concern. To imagine that all poor business is due to undercutting by competitors, which, whilst probably correct, is wrong basically, and thought should be directed into a channel which would visualise the making of such castings under ideally economic conditions and a hazard made as to the ultimate profit yielding on sale price. Then logical thought will indicate how steps can be gradually taken finally to achieve one's concept of the ideal method of manufacture. This may involve the construction of new buildings, the installation of machinery or both, and policy should be so directed that any steps taken will in no wise jeopardise the final consummation of the ideal.

The Riddle of the Sands.

Among some characteristic views delivered by a recent speaker at Sheffield were a number of references to the permeability of moulding sands. Broadly speaking, the remarks were to the effect that the permeability of a moulding sand is of no consequence, and that the whole of the gases make their escape by the vents.

We concede frankly that it is an excellent thing to have our views on any matter connected with foundry practice periodically shaken up and tested by the challenge of a direct negative. But the challenge must have sufficient foundation, and we are consequently less confident that the cause of science in the foundry, which our author has so much at heart, is really likely to be materially advanced by the application of this method in the present instance. Doubtless too much importance is attached to the question of sand permeability, especially in view of the fact that this country is more favoured by nature than any other in its possession of natural deposits. Doubtless satisfactory castings can be and are made in permanent moulds which are not permeable at all. But we may well bear in mind the old dictum that everybody cannot be wrong. There must be a substratum of truth in the convictions arising from common experience. It requires exceptional courage to contradict the accumulated experience of generations of moulders, and to consign to the waste-paper basket the patient efforts of scientific workers who are devoting themselves to the study of this very question, not only in this country, but in America, Germany, and Italy as well.

On the occasion in question a member of the B.C.I.R.A. staff was left almost unsupported to stand up for what after all is the considered teaching that results from generations of practical experience. We are much inclined to the view that permeability is an important property of moulding sands—although a good deal of experiment is still needed before the exact degree of importance can be determined. In the meantime, unless direct experimental evidence can be brought forward to support a revolutionary view, ironfounders would be more ready to accord sympathetic consideration to it if presented in a rather less startling form. Any moulder knows that vents are essential in a mould, but the gases to be cleared are generated in the sand during the casting operation, and how are these gases to reach the vents unless there are channels in the sand itself through which they—*i.e.*, the gases—can pass to the vents? For, after all, a mould cannot consist entirely of artificial vents, any more than a barrel can be all bunghole.

XUM

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Steel-Mix Grey Cast Irons.

To the Editor of The Foundry Trade Journal.

Sir,—I have read with great interest and pleasure the very excellent article under the above heading which appears in your February 2 issue. As is well known, I have been associated with the exploitation of the Lanz Perlit iron process since it was first introduced into this country, and for the last nine months my company have also controlled the Thyssen-Emmel process.

I take this opportunity of thanking Mr. Smith for his generous remarks relating to the value of Perlit iron castings. It is unusual to find an independent expert, not apparently associated with one of the Perlit licensees, admitting that Perlit iron is either novel or that it has any distinctive or valuable features.

Laboratory tests carried out on specially-cast test pieces, although they may be enlightening, do not necessarily give much help to the average foundryman, nor do they convey much to the average engineer. Physical results from test pieces to a specific analysis are no criteria of any actual results which may be obtained in a producing foundry which is endeavouring to make castings of good quality continuously.

Much has been said relating to Perlit iron produced by the Lanz process, or iron of pearlitic structure, which latter, it is stated, can be produced by other methods. There is, however, a world of difference between the actual Lanz Perlit and all other so-called pearlitic structure irons. Lanz Perlit iron is *pearlitic* in structure throughout all sections of any casting, from the exterior to the centre of even the largest sections, and all the physical properties are the same, no matter from what place or section test pieces may be taken.

Castings made by other methods, or, if you wish, processes (not patented), may have some pearlitic structure; in fact, they must have *some*, but I have yet to see any such *casting* which has this much-desired structure in the same efficient sense as it appears in Perlit, unless the Perlit process has been used either in part or wholly.

The partial use of hot moulds may not be novel, nor may the mere heating of moulds be in itself patentable, but the Perlit process was and is the only process which gives in definite form and by reliable curves and diagrams distinct and practical information as to the correct temperature to which it is necessary to heat such moulds in combination with the correct metal mixture and casting sections.

The obtaining of this information occupied many years of patient research and cost many thousands of pounds.

I doubt whether even yet the majority of foundrymen in this country realise exactly what a correctly-heated mould means to a casting. Presumably, common sense tells us that a hot mould eliminates the chilling effect of either a green-sand mould or of a cold dried mould, and thus prevents the chilling of the outer skin or of the thin sections before the bulk of the metal has had a chance to set itself close at every junction. It has been proved a thousand times during the last three years that any old metal obtained from a cupola, if poured into a hot mould, will give a better casting, how much more so, then, will properly-selected metal, melted to the correct temperature, poured into a predetermined hot mould, produce castings continuously of high quality, without draws and entirely free from porosity, even to stand pressures of 3,000 lbs. at thin sections of, say, $\frac{1}{8}$-in. thick?

Mr. Smith kindly states that Lanz Perlit iron is to day the only iron that can be seriously considered as a non-growth iron, and this on account of its low-silicon contents. Mr. Smith is right, and most of the leading cast-iron metallurgists of Europe have been to some expense and trouble to prove this fact, but neither Mr. Smith's statement nor my own is of any importance unless they can be backed by practical results.

The various British licensees of the Lanz Perlit process have proved these claims to the utmost as they are all now using in the manufacture of their Diesel engines, Perlit iron liners, pistons, piston rings, gas valves, valve seats, slide valves, and the like, and are supplying such castings in quantities to other makers of engines. They are also making special Perlit non-growth castings for non-ferrous ingot moulds, billet moulds, cyanide hardening pots, chemical pans, boiler-stay nut caps, die-casting moulds, boiler furnace baffle plates and firebars, furnace plates and covers, hot gas fan hubs, glass-bottle moulds, muffles and boxes for annealing, melting pots for aluminium alloys and for lead, and many other castings of a similar nature too numerous to mention. I am informed that in all cases success has been obtained and many repeat orders have been received.

These facts prove beyond contradiction that, at least as far as non-growth castings are concerned, Lanz Perlit iron is becoming a recognised factor and is meeting a serious demand which is ever growing.

Mr. Smith's article is essentially upon steel-mix iron, which is presumably the correct term for the long-miscalled "semi-steel," which has had so long and undeserved an innings.

Emmel iron is essentially a steel-mix iron, and consists of a charge of between 50 per cent. and 70 per cent. of selected steel scrap, preferably rail croppings, old tyres and bar and section croppings, etc. Variable dirty and rusty steel scrap should never be fed into a cupola, but should go into the open-hearth furnace, where it can be dealt with properly.

The Thyssen-Emmel process is also the result of many years' research and costly experiment in one of the largest and best-equipped foundries in Europe, and the knowledge gained both in the laboratory and in the foundry is given to all licensees of the Lanz and Emmel processes.

I can bear out every statement made by Mr. Smith relating to the high-tensile and other physical and chemical properties of high-percentage steel-mix irons, but in Emmel, as in Perlit, we invariably recommend a higher pouring temperature than 1,400 deg. C. We aim at 1,450 to 1,475 deg. C., and these temperatures can quite easily be obtained with a maximum of 13 per cent. of charge coke. It is, however, essential that the cupola should be correctly designed and that the tuyeres should be sufficient in number and area, and particularly that the tuyeres should be individually controlled.

The design of cupola air band shown on Fig. 1 in Mr. Smith's article has long been advocated by me, and the best-worked and controlled cupolas in this country are built in this way.

Only a very few foundries in this country appear to realise that the efficiency of a properly-designed cupola is entirely dependent upon the *volume of air*, and that pressure is entirely a matter of the size of the metal and coke charged and its consequent resistance. The greater the excess of *volume of air* the greater is the amount of coke required to combust it, so as to maintain a high combustion temperature in the melting zone.

There is no justification for any cupola using more than 12 to 13 per cent. of charge coke to melt a charge containing even 70 per cent. of steel scrap and pour at 1,450 to 1,475 deg. C.

The Emmel process aims at a maximum of 3 per cent. total carbon, and this is obtained continuously with 50 to 70 per cent. of steel scrap and the balance of properly-selected pig-irons, containing the suitable quantities of silicon, manganese, phosphorus, etc., all of which are available at reasonable prices. It is quite certain that continuous high quality and reliable castings can be obtained averaging 20 tons tensile throughout all sections, free from porosity, close-grained in structure, extremely resistant to abrasion and impact, and of reasonable Brinell hardness, but containing from 1.25 to 2 per cent. silicon, by the Emmel process. Such castings can be made in green sand or cast in stove-dried moulds at a cost no more than any average quality cylinder iron now produced.

With such castings engineers can calculate closely the weight and section of each casting and can cut down their previous sections and weights by as much as 40 per cent., which surely is an advantage to the engineer, although it may not appeal to the jobbing founder who lives by weight alone.

I was recently informed by a large jobbing founder that he had been offered an order for 350 tons of general castings at £12 10s. per ton and had refused it as he could not supply good castings at that price, and he refused to make down to the quality possible at the price offered.

So the tale goes on. First, the engineers blame the ironfounders for their lack of progress, and, secondly, the founders blame the engineers for wanting their castings for nothing. Thirdly, the engineering societies and standards committees maintain low standards of tensile and other physical properties, which tend to encourage low-grade production. This attitude is entirely beyond understanding in view of the fact that approximately 75 per cent. of the weight of all engines and machinery, except perhaps locomotives, are made of cast iron.

It is extremely gratifying to this company that their present licensees are engineering companies of such world-wide repute, and all of whom possess modern foundries with large research laboratories attached, so that in taking up the Perlit process notwithstanding their previous extensive research work they have admitted its superiority and its practical value. The British licensees who have also taken up the Emmel process all admit equally the practical value of the process and the excellence of the castings they are obtaining.

We again thank Mr. Arthur Smith for his article, and hope that his views and statements will be equally appreciated by all founders and engineering companies who desire to supply superior machinery, lighter in weight, greater in strength, and in every way more reliable.—Yours, etc.,

The British Perlit Iron Company, Limited.
John A. Smeeton, Managing Director.
15, Victoria Street.

Educational Systems.

To the Editor of The Foundry Trade Journal.

Sir,—Your leading article headed "Can It Be Done?" ignores a few elementary facts which raises a doubt as to the correctness of the deductions made.

The only civilisation, of which we have any knowledge, which has ever survived for any length of time, measuring time from the geological rather than the historical standpoint, is the civilisation of Egypt, which, as far as we can determine, lasted for over 5,000 years, when it was destroyed by the influx of Grecian civilisation founded on the methods of education advocated in this article. The Egyptian civilisation was founded on an education in which the curricula was designed to instill the definitely applicable knowledge acquired in the various phases of industry.

The result of abandoning this form of education has been that each civilisation which has succeeded the civilisation of Egypt has been extremely temporary, and early showed that it was based upon a shoddy foundation due to an entirely wrong educational ideal.

The failure of our modern solution of the problems of life, and specifically the failure (despite the numerous wealth-producing possibilities in our recent inventions) to provide decent education and proper housing conditions for the population at large, indicates that the entire educational system, based as it is on the errors of the Greeks, Romans and their successors, can never build any stable civilisation.

Until we get back to the Egyptian ideal of education the rise and fall of the various empires will be as rapid in the future as it has been in the past. In America there is a very healthy suspicion of all European standards of education. How far the American prosperity is due to this healthy suspicion is hard to say, but it is unquestionably one of the factors that has contributed.—Yours, etc.,

S. M. Udale.

Holley Carburettor Company,
Vancouver Avenue and P.M.R.R.,
Detroit, Michigan.
January 30, 1928.

A Vanished Industry.

MR. J. H. EVERY, a foundry proprietor, of Lewes, Sussex, gave a most interesting lecture with the above title at a meeting of the London Branch of the Institute of British Foundrymen, held at the Engineers' Club, London, on February 2, in which he dealt with Sussex ironworks. In addition to discussing the features of the iron industry as carried out in this part of England many years ago, Mr. Every recounted in an interesting and at times fascinating manner something of the history, geology, and archæology of Sussex and the surrounding country. The lecture was illustrated by a large number of lantern slides, not the least interesting of which were those of Mr. Every's well-known museum of iron antiques at Lewes. We give below an extended abstract of the lecture.

MR. EVERY said: You have gathered here to-night from various parts of the great metropolis and its environs to listen to the story of a vanished industry. Sussex and the verges of Surrey, Hampshire and Kent were its location.

Sussex is a wonderful country bordered by the sea, sandstone cliffs at Hastings stretching away to the mass of chalk at Beachy Head. From the latter on towards Brighton, passing the Seven Sisters and the celebrated Seaford Head, we come to the large expanse of fertile plain at the base of the hills further westward. This coastland is interspersed by several streams. From east to west they run; the Rother, Ashbourne, Cuckmere, Ouse, Adur and Aron. These streams, rising among woods and glades in the Weald, were of great importance to the industry in the old days. From these was derived the water power which enabled the ironmasters to carry out their work at the furnace and forge. The Ouse and its tributaries contributed perhaps the most, but the little Cuckmere, with its "feeders," was responsible for driving the large furnaces at Heathfield and Waldron.

The ironworks were divided into two distinct classes, namely, the furnace, where the ore was collected and melted into pigs, and the forges for converting this to wrought iron. The remains of these ironworks are scattered far and wide up and down the country side, and what one might call place names, *i.e.*, places deriving their names from the industry, still linger. Thus we have Huggett's Furnace, Miners' Arms, Ordnance Bank, Cinder Hill, Cinderford, and Cinder Banks.

The origin of the industry is lost in antiquity. Whether there were works of a pre-Roman character I am unable to say, but it is certain that during their occupation of the countryside, smelting was carried on. Some friends of mine have explored and taken samples of slag at various works, and have found among the cinder beds much Roman pottery, thus proving that the industry was extant at that period. The late Mr. Charles Dawson was fortunate enough to find among some Roman remains a small statuette. This he sent to Woolwich and had a small hole drilled in the leg. This determined that the statuette was iron, and Mr. Dawson suggested it was one of the earliest pieces of ironwork. The earliest known piece of ironwork is dated about 1450, and consists of a grave slab in Burwash Church, bearing the inscription "Pray for the soul of Joan Collins."

I think the industry was carried on in a larger way by the Romans or their predecessors than is surmised, and my reason for this that in the later development of the industry, in the 15th, 16th or 17th centuries the work was continued near and by running streams, to take advantage of the water power. Friends of mine have discovered in places, far away from the streams, traces of workings, and in these cases, of course, water power was out of the question. Whether bellows worked by hand were utilised, or whether some simpler method was used in these instances, I do not know. Evidence of the existence of an extensive industry many years ago, however, is to be found in many directions. For instance, Mr. Grinsted, park ranger to Sir Archibald Lamb for 45 years, has stated that when he first entered the employment of Sir Archibald Lamb men were busily employed digging slag. It is known also that from 1870 onwards the Sussex road surveyor regularly dug into the slag heaps for road metal to the extent of 2,000 or 3,000 cub. yards per annum. Coins and pottery have also been found in the slag thus dug. It would be possible to make a bed of firewood covered with charcoal laid on the ground with the ore piled in a cone shape, shaft or shafts running through the superincumbent mass. The fuel would be set alight, and, gradually, what was solvent would melt and run out of the foot of what one might call the crater. The iron thus produced would only be just fluid enough to run. This is proved by the slag, which is largely impregnated with portions of iron left behind.

The Coming of the Blast Furnace.

About the year 1560 what one might call blast furnaces were introduced from abroad. These were described as a truncated cone—not a bad description. These were several feet in height, slightly tapered, lined with fire-resisting material, and kept filled with alternate layers of charcoal and iron, the blast being supplied probably by two pairs of blowers.

There was no great difficulty in constructing a furnace to melt iron. My grandfather, who died in 1887, used a sugar hogshead from 1830 to 1832, lined with brick and clay, and banded with iron. The blast was supplied by a home-made fan propelled by a horse walking round in a circle. Hence one can realise the importance to the industry of the many streams that rise in the forest land of Sussex. Across the ravines or valleys through the Weald can still be found traces—in many cases the actual dams—of the works which were constructed by the old ironmasters to impound the water at the streams and rivulets. I have traced at least twenty—the largest at Brede, about 120 yards in length and of a sectional area equal to a fairly large railway embankment. The metal would be tapped out on to a sand bed into pig-iron of the usual type. I have one of the old pigs in my museum. Having secured the metal in this form, it could easily be melted into fittings for the utensils and firebricks.

The method of securing the ore was very simple. Spread all over the Weald of Sussex are beds of sandstone, some containing iron—in some cases nodules of iron in the clay—and having found a suitable bed a hole would be made six or seven feet in diameter of such depth until the ore was procurable, and it would be dug away until the sides of the hole threatened to fall in. Possibly a little timbering was done, but having got the hole 8 ft. or 9 ft. or even 10 ft. in diameter, and when shoring up would become expensive, they promptly left the hole and dug another within close proximity.

The industry was at its height about the year 1550.

(Mr. Every here showed a map indicating the positions of the furnaces in the year 1574.)

Charcoal Resources.

Fuel, of course, was the first consideration. The whole country side was thickly wooded—it is even so to-day—and trees were felled and converted into charcoal for use in the furnaces. At many places the position of the charcoal burnt used to be traced, because if you disturb the turf at spots where it is growing indifferently, the sub-soil will be found to be disintegrated charcoal. The supply of wood, however, though wonderful, was not inexhaustible, and it is not surprising that steps were taken to regulate the felling of timber. Thus it was laid down that none could be cut within four miles of the South Downs and these steps were taken following on complaints from various parts of the area. For instance, from Brighton and Rye it was complained that the exhaustion of timber was depriving inhabitants of materials for shipbuilding, etc.

Ordnance Development.

About the middle of the 18th century the making of Ordnance or Cannon was largely developed, and there are interesting records of the outputs of the furnaces, particularly at Heathfield. Charges for carrying wood for the furnaces by the cord—a cord being 126 cub. ft.—and moving many tons of what we know as ore, but which they called "mine," and of pig-iron, are frequently to be found in the records. We find distinction made as to the quality of the ore, some being known as "veins" and other as "bottom mine." Accounts were rendered for the bringing of three patterns for guns, whilst it appears that the stipend of the founder was 7s. 6d. for every "founday." In the years 1734-40, 236 guns were made, of a total weight of 200 tons, and in the year 1740-41, the number was 117 guns, weighing 336 tons. For many years the work of casting guns went merrily on, and gunners' wages are given as £3 per week.

Other Types of Castings.

Among the interesting things cast about this period was the iron fencing surrounding the then newly-built St. Paul's Cathedral. This contract was given to the Gloucester furnace, Lamberhurst, on the borders of Kent and Sussex, but the story runs that certain portions of the contract were sub-let. The palisading is of massive cast iron with long spikes of wrought iron fixed in the top rail. When a portion was removed some years ago, some, I think, went to America, a small quantity was secured and is now to be seen at the Archæological Museum at Lewes.

Gun Manufacture.

Mention is made in the records more than once of the boring wheel. A short time ago there was, near Maresfield, an old structure known as the "Boring Wheel Mill." To this, or a similar department, the guns were taken to be bored. Report has it that the guns were cast solid, and their holes bored in them, but I doubt if this is correct. The holes were probably cored out, and afterwards bored out. The task of cutting a hole in a solid casting, to the size of the cannon ball for a length of 8 or 9 ft., or even longer, with the primitive appliances of those days would have been a difficult one. The price received for the guns appears to have been about £19 per ton.

Nineteen guns known as 24-pounders, each 16 ft. long, were made for the Lord-Lieutenant of Ireland, and in 1753, 70 guns were made for the King of Sardinia, to the value of £2,087. About the year 1755, however, gun-making ceased, and pig-iron and forge tackle were taken from the Heathfield furnaces to Maresfield, for the use of Mr. Molineaux, a name still held in high respect in Sussex, who started a forge there. In 1770, 253 tons of pig-iron were made, and there is mention of skid-pans, garden rollers and 30 or 40 firebacks. The records come to an end in 1770, and the industry appears to have ceased at that date, just a few years earlier than at Asburnham.

Wrought Iron.

There were many purposes for which cast iron was not a suitable material, and it required to be made more ductile and to have the capacity of being forged and welded together to be made into other articles. For this purpose the forge was brought into use. To drive the bellows the water would be bayed up and a large pond formed. There are many of these still in existence, known as Hammer Ponds, and the water stored therein during the flood season or wet weather was utilised to drive water-wheels, which in turn drove the bellows. The water thus used was caught lower down to form other ponds from which it was in turn used to drive what was known as a tilt hammer, a mechanism used for shaping the wrought iron. A large piece of pig-iron would be heated in the fire until red hot, when it would be taken out and the hammer allowed to drop on it, very gently at first, until gradually the whole character of the iron was changed, and it became ductile and practically wrought iron, such as you can see the blacksmith using even to-day. Curious enough, however, one cannot trace accurate description of the working of the foundries.

Gradually towards the end of the 18th century the industry languished, and the last furnace was put out of blast about 1825 at Asburnham. There are several causes given for its decay, the principal one being want of fuel. The woods had been

cut down to an enormous extent and as they took time to grow it is easy to conceive that the dearth of fuel might easily arise. It is also traditionally reported that the cause of the works closing was that the men in charge of the furnaces were intemperate. One fact I discovered rather points to this being the case. Away at Asburnham furnace, now probably covered by undergrowth, is a large block of iron about 2 ft. in diameter and 15 in. to 18 in. thick. I do not know whether any of you have ever experienced the mishap that may be caused in a foundry by the cessation of the blast. I guard against it myself by duplicating the fan, blower, engine and shafting, and I have never had the experience myself but I am told that if for any unforeseen reason the blast stops for any length of time, the metal melting in the furnace congeals in the bottom with the result that it is not unlikely you may have to remove your furnace in order to get out the lump of molten iron. I should not be surprised if this is what happened at Asburnham, and that the large block of iron which I have mentioned was really and truly the cause of the trouble. The men might be inebriated, perhaps would not keep proper watch on the water supply, the water in the wheel would fail, the blast stop, and trouble would ensue. There is therefore probably some truth in the legend.

A Suggested Reason for Decay.

A Mr. Rhys Jenkins, who has made a study of the Wealden iron industry, suggests that possibly it was lack of water supply necessary to drive the bellows and hammers which had something to do with the decay of the industry. Seeing that the cutting down of the forest would affect the rainfall, it is probable that this was in some measure responsible, whilst the discovery in the Midlands that iron could be melted with coal, or coal turned into coke, caused the industry to drift away to the districts where this fuel could be found. It is not unlikely, however, that they had some rough and ready method of turning coal into coke because my father, in the early days of his business career, about 1844, used an oven, and made his own foundry coke from coal which could readily be bought whereas coke could not.

Away in a secluded spot in the neighbourhood is a typical old Sussex cottage, with long, sloping roof, covered with lichen, having on one side of it a small building which, it is said, was the office of the owner of the works. It was only as recently as 1883 that John Hobday, the last worker in the Sussex iron industry, passed away, so that if anyone 50 years ago had undertaken an inquiry into the history of these works they might have obtained information first hand.

Firebacks.

There are a few things manufactured in the old days which have come down to us. There are, as I have already mentioned, the railings around St. Paul's Cathedral, and there are a large number of local grave slabs. Wadhurst Church contains 18, some of them very large, and they are to be seen in numerous churches about Sussex. The most interesting things are the firebacks, and I doubt if many of you know what a fireback is. In the olden days huge chimney corners, in which logs were placed to burn, were the fashion. Many exist to-day; indeed, it was only the advent of the cheap self-setting kitchener that caused many of them to be done away with. The fire would be heaped against the wall of the house, which, if stone, soon frittered, and even if of brick the surfaces would be liable to damage. Therefore, someone instituted the idea of putting an iron plate at the back, at first quite plain, then with slight ornamentation, and later still with the date and some rope ornaments, sometimes a rope in the form of a cross, the Royal Arms of Queen Elizabeth and King Charles, the Arms and Crests of local magnates, decorative backs, and a large number of Flemish designs of classic and profane subjects. Quite recently there has been a great demand for firebacks, but I can warn you that the bulk of them which are likely to be offered to you will be spurious, because there are very few of the original ones left.

The lecture was concluded by the showing of a large number of extremely interesting slides of old firebacks, fire dogs and cranes, etc., together with views of Mr. Every's museum at Lewes. Attention was called to the curious way in which the 6's were formed in the dates moulded on the firebacks, it being obvious that they were started at the bottom and finished at the top.

DISCUSSION.

The Branch-President (Mr. W. B. Lake), in calling upon Mr. Sommerfield to propose a vote of thanks to Mr. Every, said that the lecture had been extraordinarily interesting, although there was nothing controversial about it. They had been listening to a delightful story of a forgotten industry presented in the most beautiful manner that could possibly be, and everybody had spent a most delightful evening listening to Mr. Every.

Vote of Thanks.

Mr. H. G. Sommerfield (Hon. Secretary) said it was not often that members of the Branch listened to lectures of this description, and he was sure that the interest that had been shown by the members would afford sufficient gratification and recompense to Mr. Every for the trouble he had taken to present it. When he had first approached Mr. Every some months ago to give this lecture he at once said he would, and added an invitation, in a very unostentatious way, to him to visit his museum at Lewes. When he went down, however, said Mr. Sommerfield, he was literally amazed at the collection which Mr. Every has in Lewes, and the thought at once occurred to him that it might be possible to arrange, on the occasion of the next works visit, a trip to Lewes to see Mr. Every's museum, and also to have a look round Lewes. Mr. Every had at once acquiesced in that suggestion, and he was certain that the members had a treat in store for them if it could be arranged. Mr. Sommerfield then proposed a hearty vote of thanks to Mr. Every.

Mr. V. C. Faulkner (Past-President of the Institute) said it was a matter of deep gratification that the Chairman had called upon him to second Mr. Sommerfield's vote of thanks to Mr. Every. As a matter of fact, the lecture must have brought to the minds of many of them several points of interest. For instance, there was the curious manner, to which attention had been called by Mr. Every, of the way in which the moulder in the early days made his 6's. As a matter of fact, he believed that in France it was the usual thing to go the opposite way round, and it was quite possible that the moulders in the Sussex area did the same thing. Sheffield, like Sussex, had a somewhat similar history in so far as local topography influenced its manufactures. Visitors to Sheffield would soon discover that it was really composed of five valleys, and that it was to the rivers in these five valleys that Sheffield owed its beginnings. The geography of the place had rendered the provision of dams very easy, and Endcliffe Park was a succession of little forge dams, and the last one in the series was actually called Forge Dam; whilst in one of the valleys an old tilt hammer, a model of which Mr. Every possessed, was still working. He understood that Sheffield from the very earliest days imported its iron ore from Sweden, and, situated as it was on the very edge of the coal measures, would have at its disposal surface coal, because there was a great deal of that in and around Sheffield. On behalf of the Branch he had the greatest pleasure in seconding the proposal that a hearty vote of thanks be accorded to Mr. Every for his kindness in coming that evening and lecturing in such an interesting manner.

The vote of thanks was carried with acclamation.

Mr. Every, acknowledging the vote of thanks, said it had been a very great pleasure for him to come up from Lewes and lecture before the London Branch of the Institute of British Foundrymen. As regards the curious manner of making the 6's, as shown in some of the firebacks, it rather seemed that this was a fashion in those days, because his father, who died in 1882, always made 6's in that way. He had seen him do it many times, and very likely he may have been taught to do so at school. Continuing, Mr. Every said he would be very pleased to see the members of the Branch at Lewes.

Cold Blast Iron for Mortar Mills.

An Interesting Example.

With regard to the tough and resistant properties of cold-blast pig-iron an interesting example of its value in this connection is mortar mill bottom plates. At the Low Moor Works, Bradford, for instance, a mortar mill has been in use almost continuously for seven days a week, with occasional overtime, having cold-blast pig-iron bottom-plates, making "daub" for the coke-oven plant, and also ordinary mortar for building, the throughput being approximately 6 to 7 tons per day. This bottom has been in operation for well over two years, whereas the life of an ordinary hot-blast cast-iron bottom is about six months in a good case.

This is only another indication of the fact that it is undoubtedly a paying proposition to-day in many different operations to use genuine cold-blast pig-iron, in spite of its higher price, due, of course, to the lower thermal efficiency of the blast furnace. Iron of this character is well known to be a speciality of Messrs. Robert Heath and Low Moor, Limited, and has been made at the famous Low Moor Iron Works ever since 1791, the blast furnace having no "Cowper" stove or other arrangement for pre-heating the air, which is always supplied cold at varying pressures up to 3½ lbs. per sq. in.

A Pan Mill Bottom made from Cold Blast Iron after Two Years of Constant Use.

There is still no scientific explanation for the valuable properties of cold-blast iron in spite of all the theories that have been advanced; nor for that matter is it at all clear why ordinary pig-iron with the hot blast has undoubtedly deteriorated in quality during the past half-century. One would naturally think that improved scientific methods in the operation of blast furnaces, including chemical analyiss and enormously greater throughput, together with reduction in the amount of coal per ton of pig-iron to as low as 14 cwt., would have given a better quality of iron, but such is not the case, a fact that was emphasised, for example, by Dr. Richard Moldenke in his Presidential address to the American Iron and Steel Institute last year.

Competition of Foreign Baths.

The Standing Committee heard evidence on Tuesday at the Board of Trade in support of an application by the National Light Castings Association that foreign cast-iron porcelain enamelled baths should bear an indication of their origin at the time of importation. There was but little opposition to the general principle, but details such as to the size of lettering were subjected to cross-examination. The inquiry was concluded and the Committee is reporting to the Board of Trade. A full report of the investigation will be given next week.

American Import Duty on C.I. Pipes.—The pipe founders in the United States are urging their Government to raise the import duty on cast-iron pipes from present 20 per cent. *ad valorem* to 50 per cent. According to French statistics, during the first eleven months of 1927 France exported 78,657 tons of cast-iron pipes to the United States. A short note as to the results of tests carried out by the U.S. Bureau of Standards on French pipes imported into the United States appeared in our issue for July 1 last.

Institute of British Foundrymen.

Annual Dinner of the Lancashire Branch.

The annual dinner of the Lancashire Branch of the Institute of British Foundrymen was held on Saturday, February 4, at the Grand Hotel, Manchester, and was attended by about 160 guests. Mr. J. S. G. Primrose, A.R.T.C., A.I.M.M., the Branch President, was in the chair, and among those present were the President of the Institute, Mr. J. T. Goodwin, M.B.E., M.I.Mech.E., the Lord Mayor of Manchester (Councillor W. Davy), his Worship the Mayor of Salford (Alderman A. Williamson), Mr. E. L. Read (President of the Manchester Metallurgical Society), Mr. Oliver Stubbs, and Mr. V. C. Faulkner (Editor of THE FOUNDRY TRADE JOURNAL).

The CHAIRMAN read a letter he had received from Lord Weir of Cathcart, who thanked the Council for their kind invitation, and regretted that he could not accept it as he had made arrangements for a visit to Algiers and would not return in time to attend the gathering. Mr. S. H. Heywood, the President of the Manchester Association of Engineers, was also unable to be present.

After the toast of "The King" had been honoured, the LORD MAYOR OF MANCHESTER proposed the toast of "The Institute of British Foundrymen." He said he did not know that he possessed any qualifications for proposing the toast, because he was not a foundryman, and was not aware that he had any connection with the industry. However, he had had the privilege of looking through some of the literature issued by the Institute, especially the yearly volume in which were recorded the proceedings and the Papers read before the members. To him it almost seemed that all the information necessary for the foundryman was contained therein. One of the admirable features of the Institute was the exchange of Papers not merely between the Branches in this country but also with Associations of foundrymen in other countries. Undoubtedly that would do a great deal of good. He happened to be Chairman of the Manchester Libraries Committee, and in that capacity was in touch with their technical and scientific library. By means of books, periodicals and clippings, they tried to keep up to date in regard to information bearing upon trade and industry in Great Britain and abroad. So he could appreciate the usefulness of an Institute which had a continuous output of Papers and other literature.

Training the Youth.

To maintain the status of an industry, and the standard of excellence in its products, it was necessary to make provision for training young people in the work. For that reason he was glad to note that the Lancashire Branch has a Junior Section. Another important feature of the Institute was that it united in a common membership employers and employed and brought them together in work for a common cause, the interests of the industry as a whole. Co-operation of that kind was one of the needs of the present day. He believed one of the reasons why industrial troubles had occurred was that employers were not in close personal touch with their workpeople. Misunderstandings had arisen and led to great difficulties. In recent years the feeling had been growing steadily that in order to improve industrial conditions employers and employed must come together and work together. There were indications that something would be really done in that direction; he was expecting good results to follow and he especially hoped that the unions and associations of the workpeople would not allow anything to stand in the way of reasonable arrangements enabling them to act with the employers and build up the industries of this country. There were difficulties to overcome and he was satisfied they would be overcome if the right spirit was shown. But so long as various sections refused to pull together or even fought against each other there would be troubles.

MR. J. T. GOODWIN, President of the Institute, said the Lord Mayor of Manchester had proposed this toast in very kind words which showed that personally he appreciated and sympathised with the efforts now being made to improve the relations between employers and employed. He was very anxious they should be in closer touch with one another. It was a matter for congratulation that the Institute of British Foundrymen was carrying out work of that kind.

There were people who said the real trouble in this country at the moment was inefficiency. That was not true. This country was as efficient as any country in the world. It was even capable of surpassing them and had done so in various ways during the last few years, such as automobile, railway and aeronautical fields. To maintain that efficiency was the task of the scientific associations, such as the Institute. Especially was it necessary to educate the next generation of foundrymen and in the establishment of its Junior Section the Lancashire Branch had taken a step in the right direction.

What was the work which the Branch had to do? In part it was what the Lord Mayor had told them to do. Encourage the juniors and train them to take up the good work when the time came for them to do so. Then the members must increase their own knowledge of the industry. There they had the benefit of the interchange of papers of which the Lord Mayor had spoken—interchange amongst themselves and with foreign countries. The visits to works were becoming more numerous than ever. Those visits showed that the conservatism which guarded the secrets of works no longer existed. Works were thrown open to inspection by people employed in that trade, and even by competitors.

It had been said that the foundrymen of the present day were inferior in some ways to those of the past who did their work with tools and facilities inferior to those used to-day. There might be something in that suggestion, but at the same time foundrymen to-day appreciated the advance of science, and they availed themselves of the greater knowledge it brought. Great things were done. He was quite sure the members of the Lancashire Branch were delighted to know that the Branch membership included men who had been thought worthy of the highest honours which the Institute could bestow. The gold medal given by one of them—he referred to the Oliver Stubbs Medal—had been helpful in the promotion of technical work of the highest class. The John Wilkinson Medal was unique in that it was a direct encouragement to the juniors to use their brains in the most practical way.

Whilst dealing with that matter he would add that the rising generation of foundrymen ought to be encouraged to show more enterprise, more courage, a more sporting spirit than they usually showed in these days. The safe and sure way did not always lead to a high goal. They ought to have aspirations, and try to think things out on their own account, and gain experience. They should qualify for the higher posts in the industry. When they came to settle down they would realise the benefit of the knowledge which they acquired by their adventurous spirit.

In conclusion he thanked the Lord Mayor for the very generous way in which he had proposed this toast. The Lord Mayor could take away with him the assurance of every member of the Institute that they were doing their best to progress on the lines he had recommended, to foster a Junior Section, and to try to get into closer touch with the younger people in the trade. In every branch of the Institute efforts were being made to teach them something more than the rudiments of their respective trades in the foundry, and if they would respond to those efforts, nothing but good would result to themselves and to the Institute. (Applause.)

The Guests.

In proposing the toast of "The Guests," MR. OLIVER STUBBS said they were fortunate in being favoured with the presence of the Lord Mayor of Manchester. On previous occasions when Councillor Davy's predecessors were invited to this annual function the plea was made that after the hard labours of the week Saturday evening must be kept free. It was a pleasing reflection that this gathering was so representative of the Lancashire Branch and of the Institute that the Lord Mayor would go away with a very favourable opinion of them. Anyone who met foundrymen in a meeting and learned to know them, also learned to respect them. Of Alderman Williamson, who would respond to the toast, much might be said. Knowing what his services had been to his townsmen, who had shown their appreciation by electing him Mayor, they welcomed him amongst them, and felt honoured by his presence.

The Moulders' Toast.

ALDERMAN WILLIAMSON said he must first express his thanks for the cordiality and sincerity with which this toast had been drunk. Like the Lord Mayor of Manchester, he was not a foundryman, but he scored over the Lord Mayor in this respect, that he had done the next best thing; he married a foundryman's daughter. (Laughter and applause.) He had a vivid recollection of more than one occasion when his father-in-law instilled into him the moulders' toast:—

"When we toil no more, the sand to turn.
The blast blown out, the furnace cease to burn.
We are moulders here, but so will be
Moulding with worms and insects below.
But when that great Moulder from the skies
Doth part each box and bid each pattern rise,
May we receive a steady lift above,
Blest by our Redeemer's love."

He welcomed the observations which had been made about the Institute. Some features of it must appeal to all of them. In his opinion the most important was that it endeavoured to establish a higher standard of craftsmanship by giving tuition and encouraging the growth of qualities which should make the junior members of the Institute better men and more efficient workers. His own advice to the juniors would be that they must show loyalty—loyalty to those above them in the craft, loyalty to their fellow-workmen, loyalty to the Institute of which they were members. Then he would advise them to take advantage of every opportunity that presented itself. Some men never saw an opportunity, others saw opportunities, but allowed them to pass by; there was a third class who were always on the look-out for opportunities. He would give the warning to the juniors that an opportunity once missed may never occur again. Then he would say, "Be thorough in all that you undertake. When you feel you have done a job, be quite sure that it is better than the last one. Do not think, 'It is good enough,' but try to achieve something that is worth achieving in the particular trade you are training yourself for."

Another outstanding feature of the Institute showed in the most unmistakable manner the great contribution which it made to the improvement of the relations between employers and employed. It offered to both a common platform where they could meet and reason out together the problems which affected both, without any feelings of antagonism being aroused. Since he became Mayor of Salford he had set himself the task of visiting employers in that city to find out what their difficulties were. It was said they could not get the right type of men from the Labour Exchange. He had himself visited the Labour Exchange, and he thought he could satisfy the employers that by organised effort a method of procedure could be devised which would ensure the right type of men being had from the Labour Exchange. He hoped the scheme would be successful.

It was said the basic industries of the country were in a bad state. It was a true statement though somewhat difficult to reconcile with other facts, for example, the statement that there are more people employed in this country to-day than at any previous period in its history. He believed the nation would pass rapidly through this period of depression. They knew about the development of artificial silk and the prosperity of the electrical industries, and he could give other instances in which improvement was showing itself. Still the question of unemployment was a serious one, and

the workman's legitimate demands must be satisfied. The only remedy was in co-operation and combination between employers and employed to secure increased production, and the Institute did its part in fostering that spirit of co-operation. So he said to its members, "God speed you in the work you are doing. Long be your life, venerable your age. May you for many years enjoy the prosperity which comes from the combination of workmen and employers." (Applause.)

The Chairman.

Mr. V. C. Faulkner, proposing the toast of the Lancs Branch, said he had known it intimately for seven years, and had taken part as a guest in this annual function in each of those years. He had watched with much pleasure and pride the progress it made, and regretted that when his visits were made industry was not flourishing in the Lancashire area. At the present time things were very bad. Some writers in the London Press ascribed that state of things to lack of imagination, or perhaps it would be better to say lack of salesmanship on the part of the large employers in the area. But that was only partially true.

This toast would be replied to by the Branch-President, Mr. J. S. G. Primrose, who had three qualifications for the office he held. Primarily, he was a very erudite individual. The scope of his erudition could be gauged by a perusal of the books and papers which he had written. Then he was a very modest individual. Though he had every right to call himself "Doctor," he preferred to be known as plain "Mr." The third qualification was that he was wonderfully enthusiastic. The gathering that evening was a tribute to his enthusiasm.

The CHAIRMAN said usually at a meeting he could take his own part, but on this occasion he found it very difficult to give adequate expression to his feelings. He must content himself with saying that he much appreciated the way in which they had honoured the toast. He was proud to have served the Lancashire Branch. Up to 1923 the Scottish Branch held the premier place in membership, since that year the Lancashire Branch had occupied that dignified position. It was merely a coincidence, of course, that the change coincided with his arrival in Manchester. (Laughter.) Everything that he could do to encourage the juniors he had done. He helped to establish the "John Wilkinson Medal" competition. Considering what had been done he felt that the Lancashire Branch had striven to realise the motto of the Institution, which he was afraid was sometimes forgotten—"Science hand in hand with labour." They were trying to get the men who would labour in the industry to have the scientific outlook. It was the only way in which they could make the progress which they so much desired.

Diplomas Awarded.

His next duty was to ask the President to present diplomas to two members who had distinguished themselves as the joint authors of a Paper entitled, "Refractories in the Foundry," read at a meeting of the Branch on May 1, 1926. It was the practice of the Institute to publish in its Proceedings Papers selected from those read before the various Branches and to award diplomas to those which were of exceptional merit. On more than one occasion the Council of the Institute had gratified the members of the Lancs Branch by giving this distinction to one of the members of the Branch. Two members were to receive the diploma—Mr. H. V. Grundy and Mr. A. Phillips, both of Manchester, because they were joint authors of the successful Paper. A diploma has also been awarded to Mr. J. W. Donaldson, B.Sc., A.I.C., of Greenock, for his Paper on "The Heat Treatment and Growth of Cast Iron," which was read before the Branch on January 8, 1927.

The PRESIDENT said he would emphasise what Mr. Primrose had said. The preparation of a Paper entailed a considerable amount of work, and much time was spent on it. It was a great pleasure to him to make the presentation because he felt it was evidence that they were getting into closer touch with one another. He hoped also that these gentlemen, having given evidence of their ability, would, ere long, give the Branch another valuable Paper.

The recipients made brief speeches in acknowledgement.

The dinner was preceded by a progressive whist drive in which 112 players took part, a number of prizes being awarded. It was followed by a dance, and there was unanimous agreement that the programme had been admirably arranged and carried out.

Staffordshire Iron and Steel Institute Annual Dinner.

Sir Wm. Larke on Competition in the Iron and Steel Industry.

The sixty-second annual dinner of the Staffordshire Iron and Steel Institute was held at the Dudley Arms Hotel, Dudley, on Saturday last, when the principal guests were Sir William J. Larke, K.B.E. (Director of the National Federation of Iron and Steel Manufacturers), Mr. F. W. Harbord, C.B.E., F.I.C. (President of the Iron and Steel Institute), the Mayor of Dudley (Councillor F. J. Ballard), Mr. J. G. Pearce, B.Sc., M.I.E.E. (Director of the British Cast Iron Research Association, and Mr. Owen F. Grazebrook, of Dudley. A good muster of members attended.

Proposing "The Iron, Steel and Coal Trades," SIR WILLIAM LARKE said that Staffordshire still made 40 per cent. of the wrought iron produced in this country, but he sometimes thought that those gentlemen interested in its manufacture were far too modest. They knew how to make it, but he suggested that they did not know how to sell it. They did not emphasise sufficiently the difference in quality of their product compared with that of such a country as their principal competitor—Belgium. They ought to go to their customers and point out the many uses to which wrought iron could be put and where it was superior to steel. He made the suggestion because it applied to British industry as a whole and particularly to those trades with which they were concerned. He pointed out that on the steel side they imported some 4,400,000 tons of steel in 1927 following the coal strike, but had that quantity been made here in addition to their own production of 9,000,000 tons, their works would have been more than busy. As Britishers they must learn to say a little more about the efficiency of their products. Their unemployment problem and the depression in the iron, steel and coal trades could only be overcome by co-operating to secure an industrial revival. They could not live in water-tight compartments, and producers and consumers ought to co-operate to direct the purchasing powers of the country towards employing British labour, and if they did that they would get in the iron and steel industries such an increased volume of production that they would be able to materially lower their prices. They had no real reason to be depressed, but they were facing very great difficulties. The remedy was an industrial revival, and their national, financial, commercial and industrial policies had to be directed to that end. Co-operation between home industries in using home products would largely achieve that.

There was one important aspect of the production of steel which was very encouraging for the home industries. In 1927 the world produced 100,000,000 tons of steel for the first time in history. America in that year produced 4,000,000 tons less than in 1926, which meant that Europe produced a great deal more. In this country the production was 5½ million tons more than in 1926. So that Europe made a very definite progression; but when he came to examine where that steel went to, they would be interested to know that most of it was consumed in the steel-producing countries of Europe in the development and extension of the productive capacity of industries. Therefore they might expect stronger competition on the manufacturing side, though he did not think that on that account there was cause for undue alarm. From the standpoint of what the potential demand of the world ought to be the production of steel was only about two-thirds of what they might expect it to be, and when the world secured some measure of economic stability he believed there would be an increased demand for iron and steel products; but they had got to improve the efficiency of their industries per unit of labour. That meant closer co-operation with the working men and preaching to them the axiom that the only secret of high wages was lower costs. To sell their goods abroad they had to send out young men who understood how the product was made and how to apply it—men who had learnt technical salesmanship—and they could not do that as individual firms. Moreover, they wanted their technically equipped representatives not only to sell the goods and show to what uses they could be put, but to advise them as to the needs of the markets. In regard to the coal trade, Sir William added that it had always seemed to him a pity they should export so much fuel. How much better if they could use it here and export the products. The economic use of coal was going to extend its consumption. In regard to research work in this connection, he believed they were on the fringe of great developments.

Responding, MR. OWEN GRAZEBROOK reminded them that South Staffs might claim to have taught the world how to make pig-iron. They had been proud in the past of their individuality. Their troubles now, however, were national, and they could no longer afford to fight them as a district. They were criticised sometimes by the bankers for lack of enterprise, but they could not rebuild if works did not make money. It was only by sticking together that they would solve their problems.

The PRESIDENT (Mr. F. S. Wilkinson) then presented the Institute Research Medal to Mr. Bernard Thomas for a Paper on "Nitrogen in Metals."

The toast of "The Staffordshire Iron and Steel Institute" was submitted by the MAYOR (COUNCILLOR BALLARD), who referred to the availability of many sites in the borough for new works, and extended a welcome to any employers who contemplated building.

The PRESIDENT (Mr. F. S. Wilkinson) responded.

MR. P. JUMP (Vice-President) toasted "The Guests and Kindred Associations," and MR. F. W. HARBORD replied.

Manganese in the United States in 1927.

The inland deliveries of manganese ore containing 35 per cent. and more of metallic manganese totalled in 1927 about 43,600 tons of 2,240 lbs. as against 46,258 tons in 1926. The deliveries of metallurgical ore in 1927 amounted to 26,000 tons compared with 26,530 tons in 1926. The deliveries of chemical ore in 1927 amounted to 17,600 tons, as against 19,728 tons in 1926.

The quoted price of high-grade manganese ore decreased materially in the latter part of 1927. Quotations for foreign ore, crude, have been about 33 cents (16½d.) per unit, whereas the average price in 1926, Atlantic seaboard, was 39 cents (19½d.) per unit.

Figures furnished by the U.S. Bureau of Foreign and Domestic Commerce show that during the first eleven months of 1927 the metallic content of imported ore was 276,823 tons. The gross tonnage was 554,382 tons. This included imports from Cuba. Assuming that the imports for December were at the same rate as during the first eleven months, the total imports would be about 605,000 tons as compared with a total of 738,000 tons of 2,240 lbs. in 1926. The decrease in imports is attributed in the main to the decreased manufacture of steel during the year, and possibly to the draft on stocks in the hands of consumers. The imports of manganese ore from Soviet Russia for the first eleven months of 1927 amounted to 223,099 tons, compared with 254,885 tons for the entire year of 1926. Brazil furnished 150,026 tons in the first eleven months of 1927, compared with 272,287 tons for the entire year of 1926. British India furnished 87,817 tons for the first eleven months of 1927, compared with 63,742 tons for the entire year of 1926. The imports from British West Africa (Gold Coast) for the first eleven months of 1927 amounted to 81,200 tons, compared with 100,614 tons in 1926.

For the first eleven months of 1927 the manganese content of ferro-manganese imported into the United States was 25,684 tons, as compared with 36,521 tons for the same period in 1926.

The deliveries of ore mined in the country containing from 10 to 35 per cent. of manganese (ferruginous manganese ore) in 1927 were 134,000 tons, as compared with 564,312 tons in 1926. The inland deliveries of ore containing from 5 to 10 per cent. of manganese (manganiferous iron ore) in 1927 totalled 1,317,000 tons, as compared with 835,412 tons in 1926. There was a very decided increase of production of ferruginous manganese ore in Colorado in 1927, when 29,600 tons were produced, against 2,925 tons in 1926.

The apparent outstanding features of 1927 have been the increase in the home manufacture of spiegeleisen and the increased production and consumption, relative to the production of steel, of ores having a low metallic manganese content. While the combined production of ferruginous manganese and manganiferous iron ores in 1927 differs but slightly from the production of 1926, the gross tonnage of steel produced has decreased.

British Industries Fair.

BIRMINGHAM SECTION.

This exhibition, which opens next Monday and continues until March 2, presents unique opportunities for foundrymen for forwarding their business interests. Many are actual exhibitors, whilst some foundry or other has somewhere in the background contributed something towards the production of any article or machine exhibited. Even the drop forger, the arch competitor of the foundry industry, still uses castings in the form of ingot moulds, furnace castings, rolls, and hammer frames before he can produce his finished article. Thus the enlightened foundryman visiting the exhibition would do well always to imagine what castings are incorporated in or are essential to the fabrication of any article. The following description is given with the object of saving the time of visitors, and to give those readers who find themselves unable to go to Castle Bromwich a rough picture of the exhibits of foundry interest. Furthermore, there is an interesting display of actual equipment for foundries, not so much the obvious, but rather of the type which is bought at infrequent intervals, such as scrap bundling presses, pyrometers, pulverised fuel plants, and the like. We propose to classify the exhibits into four sections:—Foundry equipment, foundry requisites, foundry products, and allied industries.

FOUNDRY EQUIPMENT.

Allen-Liversidge, Limited, Victoria Station House, Westminster, S.W.1.

This firm is exhibiting their well-known oxy-acetylene equipment for welding, metal-cutting and lead burning, together with all supplies and accessories required for these operations. Most of the outfits shown are of the high-pressure type, employing dissolved acetylene, but low-pressure outfits will also be exhibited.

On the same stand will be shown a full range of A-L air-acetylene tools for paint-burning, brazing, soldering, cable-jointing, and work of a similar character. These tools are very light and handy, and are used with a small cylinder of dissolved acetylene only, no auxiliary gas being required.

Frequent demonstrations of all these outfits will be given.

At a second stand there is to be shown electric arc and electric resistance welding equipment. Within this stand will be a demonstration shop in which demonstrations of the work of the "Alda" Arc Welder will be given. There will also be exhibited butt welders, spot welders and rivet heaters, which may be seen in action.

W. & T. Avery, Limited, Soho Foundry, Birmingham.

The House of Avery have decided, in this instance, to break away from the usual method of exhibiting their goods. To make the exhibition more interesting to foreign buyers, as well as to visitors in general, they have given up their stand to an exhibition of tableaux showing the evolution and history of weighing throughout the ages.

The educational value of this presentation of historical facts will undoubtedly react to the benefit of the whole weighing machine industry. The stand represents a temple on which the emblem of weighing, viz., the Arm of Justice holding a pair of scales, is the prominent feature. Six tableaux are visible through plate-glass windows, and they represent:—(1) Weighing in ancient Egypt about 2,000 B.C.; (2) King Arkesilas II, of Cyrene (580-550 B.C.), superintending the weighing of a cargo of silphium—the assa-fœtida plant; (3) weighing in Imperial Rome; (4) weighing in England about 800 A.D.; (5) weighing in a French market place during the 15th century; and (6) weighing gold and silver plate in a large London goldsmith's shop about the end of the 17th century.

One side of the temple is open, and through an archway you enter the major hall, in which are shown a few choice examples of the latest development in the weighing machine industry. This hall is treated in a black and white scheme of ultra-modern design.

The end portion is taken up by a proscenium in which is shown the masterpiece of measuring instruments of the latest design, absolutely fool-proof and perfectly accurate, measuring to the drop.

From this hall you enter a minor hall which is a perfect picture gallery, showing a voluminous collection of photographic enlargements of Avery products in weighing, counting and testing machines.

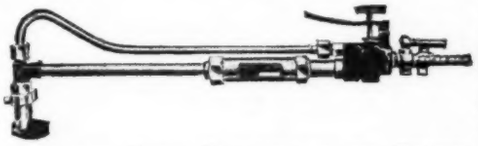
Bowen Instrument Company, Limited, 9, Newton Road, Leeds.

As pyrometers are an essential in a modern foundry, visitors will find on this stand an instrument for every purpose. For the non-ferrous foundry dealing in low-melting point alloys there is a thermo-electric pyrometer reading to 150 deg. C., whilst for aluminium and copper alloys suitably calibrated instruments are available. This type, too, is available for controlling the annealing of malleable iron, heat treatment of castings and similar operations.

Electrical resistance pyrometers suitable for controlling core ovens and mould stoves are being shown, whilst for higher temperatures associated with liquid metals (above, say, 500 deg. C.), there is a choice between radiation and optical pyrometers. Naturally the modern demand for automatic recording is well catered for, and cognisance has been taken in the various types shown of portability, robustness and simplicity. For demonstration purposes, the electric furnaces made by Messrs. R. W. Chatterton Smith, of Chelsea, are being used.

The British Oxygen Company, Limited, Angel Road, Upper Edmonton, London, N.18.

In connection with foundry work attention is drawn to the fact that a cast-iron cutter, which is shown, is suitable for cutting off risers, headers, etc., whilst many varieties of portable equipment for welding and cutting for use around large factories, foundries, etc., are exhibited. For instance, three types of profile cutting machines will be



A WELDING TORCH EXHIBITED BY THE BRITISH OXYGEN COMPANY, LIMITED.

shown. Out of these, one is an entirely new production, being shown in this country for the first time. It is a simple hand-propelled machine for cutting irregular profiles from a blue print or sketch. It is suitable for installation in any small engineering shop where no power supply is available, the machine being complete in itself, suitable for standing on an existing bench or table.

The other profile cutting machines are the now well-known Universal cutting machine in two sizes.

W. Canning & Company, Limited, 133 to 137, Great Hampton Street, Birmingham.

This firm are again showing an extensive range of exhibits calculated to interest those in the foundry and metal finishing trades. Of these, one is the "Canning" warm nickel plating apparatus, by means of which nickel plating outputs are increased. Chromium plating apparatus is also on view at the "Canning" stand, and should prove of great interest in view of the attention which this finish is receiving at the moment. There are, in addition, a selection from the extensive range of polishing lathes, polishing motors and grinding machinery, together with samples of polishing materials. A range of lacquers is shown and a spraying plant for three operators is exhibited, in company with lacquers and lacquering equipment.

Davidson & Company, Limited, Sirocco Engineering Works, Belfast.

A representative selection of the various types of the well-known "Sirocco" fans is being shown on this firm's stand, and affords the visitor an excellent opportunity of inspecting their design and construction, as well as the special features each type possesses. Fans for ventilation, for dust removal, for high-pressure blast, all suitable for foundry operations, are exhibited, as well as such accessories as steam air heaters and dust collectors. Important component parts of fans too large to be exhibited are also on view, including bearings, both ring-lubricated and water-cooled.

In view of the general interest in smoke abatement at the moment, it is only to be expected that the Davidson Patent flue-dust collector holds an important position on the stand, being represented by two models, of which one can be seen in operation. Placed on the market about four years ago, the Davidson collector has proved to be an eminently successful means for extracting the dust from the flue gases, and thereby preventing the discharge of grit and dust from industrial chimneys. Already over 400 plants have been supplied, with an aggregate collecting capacity of about 300,000 tons of dust per annum.

The Denbigh Engineering Company, Limited, Horseley Heath, Tipton, Staffordshire.

This well-known firm, which has now sold 700 moulding machines in England, is exhibiting their latest ball-bearing ram type machines, one of each No. 1 turnover and straight draw. There are a number of pattern plates and box parts, as it is their intention to demonstrate the work made by the two machines named. It will be remembered that the Denbigh Marvel machine is unique in that it is the only hand-operated jar-ramming machine on the world's market that is of British conception, design and workmanship.

Mr. Tomkins is in charge at the stand.

General Electric Company, Witton, Erith and London.

The vast group of factories situated at Witton, will be represented by three or four exhibits which form merely a section of the output of what is rightly claimed to be one of the largest groups of electrical engineering factories in the world. The fact that these Witton factories of the G.E.C. are adjacent to the fair, is, however, an excellent reason why the many phases of electrical industry with which it is concerned are not more generously represented. Overseas and other visitors to Birmingham make an excursion to Witton a definite part of their programme; the mere fact that constructional work can be seen in actual progress in factories laid out on thoroughly scientific lines and furnished with the most modern machine tools, handling appliances and apparatus, operated by a highly-trained technical staff, carries a far deeper and more lasting impression of the remarkable resources and ramifications of the company than any other course could possibly do.

Witton display will comprise three principal exhibits, first, a 60-h.p. "Witton" synchronous induction motor; secondly, a 2-motor all-electric traction control equipment in operation and a 240 h.p. railway motor; thirdly, a 10 h.p. high torque squirrel cage "Witton" motor with contactor-type star delta starter operated by push-button control.

In general mechanical design this type of machine differs but slightly from that of the ordinary induction motor; the main difference is in starting characteristics. Its great value lies in its ability to improve the power factor of the system on which it is working.

The great strides recently made by the G.E.C. in the realms of electric traction make it singularly appropriate that their exhibit should include traction equipment. There is to be shown in operation an all-electric two-motor traction control equipment, also a 240-h.p. motor, the whole of this gear being exactly as supplied to the London electric railways.

The exhibit of the Fraser and Chalmers Engineering Works, at Erith, portrays examples of a few representative lines which are very much to the fore in the engineering world to-day. No branch of engineering comes more within this

category, perhaps, than that of pulverised fuel, and in this direction the Fraser and Chalmers Engineering Works are showing a model of a plant consisting of an F. & C. Impact Pulveriser connected to a Lancashire boiler. The pulveriser is one of the makers' latest designs and embraces some new and interesting features; among which are:—(1) The ease of control of the pulverised fuel; (2) low power consumption; (3) efficient pulverisation; (4) compactness of design.

The body of the pulveriser is made in halves, thereby ensuring easy inspection, and it will be seen that the separating chamber is of a design conducing to pulverisation remaining constant. The burner itself, of the Virtex type, has been specially developed in relation to Lancashire boilers, and is the result of many years experiment and research. This burner makes for most efficient operating and ensures complete combustion within a few feet of the boiler front.

W. & J. George, Limited, Great Charles Street, Birmingham.

A laboratory being an essential to a modern foundry, our readers will be attracted to this stand, whereon is shown a special design of chemical laboratory bench, which they manufacture. They also show their makes of chemical balances and many types of laboratory equipment.

John Hands, Limited, Cardigan Works, Belmont Row, Birmingham.

This firm's main exhibits are of considerable interest to the competitors of the foundries, the drop forgers, but our readers handling scrap which requires cutting up before melting will be interested in a geared undercrank power-driven guillotine shearing machine. This machine is suitable for cutting iron or mild steel up to ½-in. thick by 4 ft. long, with the greatest ease. All adjustments to compensate for wear in all bearings or grinding of knives can be easily obtained, and all working parts have generous wearing surfaces. The machine is fitted with a special cam-actuated automatic holding-down apparatus, which is operated from a cam on the crankshaft and by a toggle-lever movement, thus eliminating any parts being in motion when the holding-down beam is gripping the material, the pressure of which is adjustable. The stand is in charge of Mr. C. S. Woolard.

Holden & Hunt, Cox's Lane Works, Old Hill, Staffs.

Most steel founders do not disguise the fact that the welding department is an important accessory to their production, though obviously they do not advertise the fact. For this class of founder the spot welders, shown in three different sizes, will present many features of interest, though it is the largest which is the most attractive, as it tackles work up to ¾ in. in cross-section. It is interesting to note that founders are invited to bring specimens of their own castings for trial welding.

Imperial Chemical Industries, Limited, London and elsewhere.

In the Birmingham Section of the Fair the group of companies, including Nobel Chemical Finishes, Limited, Naylor Brothers (London), Limited and the Frederick Crane Chemical Company, Limited, will show their products in close proximity one with another.

This development of Imperial Chemical Industries is one which has far-reaching consequences, and it may now be stated that there is not a single finish for any purpose which is not made. The new cellulose paints and varnishes are making rapid progress. This company also markets British-made wall papers and, in fact, it may be said there is no finishing material in the form of paint, varnish or paper which they do not produce.

At Birmingham also there will be shown Crawshaw's Chemical Colander on a separate stand. This is a development on the chemical side of the business which enables engineers and others to remove grease from metal parts in a practical, efficient and economical manner with the aid of a chemical.

International Combustion, Limited, Africa House, Kingsway, London, W.C.2.

This house is showing various component parts of the well-known "Lopulco" plant; the Commercial Pulverising Department of the same company of 11, Southampton Row, is displaying the method of grinding and screening various materials.

Amongst the exhibits there are a pulverised fuel feeder, which has been brought out since the last Fair; the "R" burner, which has, by reducing greatly the flame length, made it possible to instal a smaller combustion chamber than hitherto. This in itself has altered very considerably the whole design of the "Lopulco" system; "Murray" tubes and heaters, for lining the combustion chamber walls, and take the place of the older fashioned refractories. The great advantage lies in reducing to a negligible amount the furnace up-keep costs, and by being connected to the boiler, in increasing to a marked degree the evaporation of the whole unit; and a Raymond mill, which is a most important part of the system.

Mastabar Belt Fastener Company, 14A, Blackfriars Street, Manchester.

The object of this exhibit is to give practical demonstrations of the firm's system of joining up power transmission belts.

Metallisation, Limited, Pear Tree Lane, Dudley.

Willmot super trucks, manufactured entirely of steel, ball bearings, rubber tyres, spring chassis, brakes and scotches is the principal exhibit of this firm, but coatings of all metals on articles for decoration, and resistance to corrosion will also be shown. Aluminised coatings for resistance to high temperatures, and homogeneous lead-lined tanks are included in the latter category.

Mr. F. C. A. Fieldsend is in charge of the stand.

The Metropolitan-Vickers Electrical Company, Limited, Trafford Park, Manchester.

Important new features mark the exhibit of the Metropolitan-Vickers Electrical Company, which again represents some of the Company's many lines of equipment designed to meet the needs of practically every branch of industry and domestic service.

A notable advance in the development of arc welding equipments is made by a new portable single-operator set exhibited by the Metropolitan-Vickers Electrical Company. In principle the new set is similar to the Metrovick fixed or semi-portable types, but its portability and compactness enable it to be brought close to the work even in cases when little space is available.

With ordinary equipments operation in restricted space is often inconvenient owing to the necessity of using long leads from the generator and because of the operator having to return to the set for every adjustment of regulation.

The new set consists of a 175 ampere 25/80 volt self-stabilising generator driven by a suitable motor, the two machines being mounted in one carcase on which the necessary control gear is mounted. The whole unit is only 51 inches long, 34 inches wide and 39 inches high, and weighs only 1,400 lbs. It can easily be transported on a small truck on which it is supplied as a standard equipment, or lifted alone into position for work under very limited space conditions.

Metrovick arc-welding sets consist of a direct-current generator driven by an A.C. or D.C. motor, together with suitable control gear. The generator has notable self-stabilising characteristics, by which it maintains an arc giving constant heating effect without the use of a resistance.

In this way the whole of the energy generated is usefully employed at the arc, resulting in a large saving in power consumption and increase of output of work by reason of the ease of control. The Company's exhibit includes practical demonstrations of welding, carried out with a standard M-V. set. The demonstrations will take place at frequent intervals, and at any time by request.

Metropolitan-Vickers motors for industrial service range from 1/40 h.p. to 250 h.p. for general purposes, and sizes up to 25,000 h.p. for special heavy duty installations. Specimen small motors are exhibited on various D.C. and A.C. types, find a wide application in the foundry industry.

A new line of Metrovick ironclad starting and control panels for D.C. motors up to 50 h.p. at voltages up to 500 v. is represented by a panel arranged for use with a variable speed motor of 15 h.p. The equipment includes a protected type starter fitted with no-volt release and adjustable overload release and a rheostat giving regulation of the motor from half to full speed. An ironclad combined switch and fuses is also included, this being so arranged that the fuses can only be made accessible when the switch is open. The equipment thus not only gives protection but also provides means for isolating the motor, as required by the Home Office Factory Acts Electricity Regulations. An ammeter as an optional accessory completes the equipment, which is mounted on a steel panel with bushed cable entry and all live metal entirely enclosed. The range of panels includes more than thirty combinations of equipment to meet different requirements. Owing to their strong construction, to their safety in unskilled hands and to their moderate prices, the panels find a wide field of use in industrial applications of all kinds.

A Metrovick type SF. switch pillar of 250 amps. capacity at 3,300 volts is exhibited. Originally developed for service in mines these pillars have also been extensively adopted for other kinds of industrial service. They are made for service up to 3,300 volts with flameproof enclosure and up 6,600 volts with non-flameproof enclosure. The switch unit is an oil circuit-breaker fitted with a loose handle and designed to give a high speed break. It is arranged to slide upon aligned steel bars fixed to the pillar and when withdrawn from the sockets the breaker and all accessories are completely isolated from the supply. The instrument transformer compartment and the busbar chamber are compound filled. Special features are included to give automatic protection and also to guard against mistakes liable to be made by careless or unskilled operators.

An interesting show-board on the Metropolitan-Vickers stand displays specimens representing the Company's wide range of meters, instruments, voltage regulators and protective devices for power systems of all kinds. Items of especial interest are a new line of 7-inch flush and foot mounting, edgewise type ammeters, voltmeters and power-factor meters, and watt-hour meters fitted with prepayment and maximum-demand-indicator attachments.

Metro-Vick Supplies, Limited, 155, Charing Cr ss Rbad, London, W.C.2.

The latest addition to the range of Cosmos electric cookers is the new small model specially designed for installation in flats, bungalows and small houses. All cooking operations for three to four persons can be carried out on this small model. Constructed from specially selected sheet steel, finished stove enamelled black, with nickel plated top plate and rounded moulding with white enamelled plate on door. The front legs are of tubular section, nickel-plated and polished. The oven is fitted with a renewable single unit lining, all corners are rounded. The oven runners are easily removable, and the whole is finished vitreous enamel.

Elements are fitted in top and bottom of oven and the grill is situated in the centre of the top oven element.

The new model is available in two types, one fitted with 8⅛ in. dia. Boiling plate and the other with two boiling plates, one 6¼ in. dia. and one 4¼ in. dia.

Various models of the standard Cosmos electric cooker are also exhibited, and demonstrations of all types will be given daily during the exhibition on the stand, or if desired, demonstrations can be arranged at the Company's showrooms at 33, Paradise Street, Birmingham.

W. & C. Pantin, 147, Upper Thames Street, London, E.C.4.

It is impossible to overstate the importance of transport in foundries, and it is essential that founders should make themselves familiar with the developments such as this firm are exhibiting. These consist of an inclined drag type elevator for raising boxes; an installation of gravity-roller-conveyor for conveying them, and an inclined patent belt lowering apparatus for lowering them and automatically delivering them on to gravity roller conveyor at the bottom.

Pneulec, Limited, Mafeking Road, Smethwick, Nr. Birmingham.

The exhibits chosen by the above firm as representative of their line of foundry equipment are the Pneulec-Rover sand-mixing machine: the P.E. type electrically-operated jolt-ram moulding-machine: cores made with Pneulec core oils, the bottom section of a Pneulec combination windbelt type cupola, and drawings showing arrangements of core and mould-drying stoves operating on the

Plenum system. Pneulec have arranged for firms interested to visit local plants where the above and other of their foundry equipment can be seen working under everyday working conditions.

There will be two sizes of Pneulec-Royer machines working on the stand. This machine was exhibited for the first time at last year's fair, since when there have been one or two slight modifications in design, including a new type of sand comb, and fitting ball bearings. The principle of the machine remains the same, and it is the only machine working on the belt principle. One important advantage claimed for the machine, in addition to the quality of treated sand, is the low power-consumption. The No. 1 machine, which is fitted with a 1 h.p. motor, consumes 0.7 h.p., and the No. 2 size, which is fitted with a 2-h.p. motor, consumes 1.25 h.p. under full load.

The point of importance in the P.E. type electrically-operated jolt-ram machine is that it is a power-moulding machine which is self-contained. No compressor plant is required for its working. A 5-h.p. motor supplied with the machine makes it a complete independent unit. The method of obtaining the jolt is by air compression in the cylinder and the arrangement is such that any required density of jolt can be obtained. The pattern draw is mechanical by means of a screw off the motor shaft.

The 3-ft. 6-in. dia. cupola is fitted with drop-branch tuyere arrangement. A C.I. bend connects up to the underside of the windbelt to the cupola shell, and leads the air from the belt to the cupola. With this arrangement the tuyere is easily get-at-able, and it is impossible for slag to get into the belt.

As Pneulec are able to show drying stoves operating in local plants, only specimen layout drawings will be shown on the stand. It is claimed that with the Plenum system (the system on which Pneulec drying stoves operate) there is always a uniform temperature in every part of the stoves, so that all cores and moulds being subject to the same temperature are dried uniformly. There is a constant changing of air inside the stoves (the clean hot gases are forced in) so that cores and moulds are subject only to a clean dry heat which is essential for quick drying.

There will also be specimen cores made with various Pneulec core oils, and particular prominence is given to Pneucol and Semi Solid. The former is used in the production of intricate cores for high-class work, and the latter where a stiff green-bond is essential, and when price is an important factor.

Rapid Magnetting Machine Company, Limited, Magnet Works, Lombard Street, Birmingham.

Though this firm is not showing examples of every type of machine manufactured by them, several types will be on exhibit, many of which are of particular interest to founders. Primarily there are the high and low intensity patterns of "Standard" type electro-magnetic separators; the high intensity type "BB" electro-magnetic separators; and three different patterns of electro-magnetic drums of the type "P" which is used in conjunction with conveyor bands, and is the most interesting for the industries which we cover.

Another interesting machine is the electro-magnetic chute, the design of which is similar to that embodied in the high intensity type "BB" machine, whilst electro-lifting magnets for steel works and foundries relate to questions of paramount importance to foundries.

Unfortunately space does not permit the showing of all their specialities for the foundry, but, in regard to the testing of scrap metals, attention should be paid to the bench, suspension and hand magnets used for separating iron from brass for scrap. Should there be a piece of iron which has been brassed over, this is a magnetic means for its detection.

The "Hand Magnet" which is plugged into a lamp socket consists of a small magnet weighing approximately 6 lbs., which is highly magnetised.

Geo. Salter & Company, Limited, West Bromwich.

On this stand of interest to foundrymen is a spring balance for use in connection with a crane up to 100-tons capacity, and platform machines, suitable for weighing up charges.

Sheffield Steel Products, Limited, Templeborough, Sheffield.

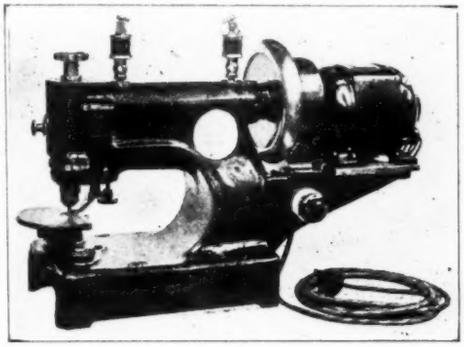
This stand is of striking design, arranged in a series of steps and carried out in black, green and white, in keeping with the general colour scheme featured by the Company. The goods displayed are in two separate classifications, cutlery being shown on the right hand and tools the remainder of the stand. At the corner is arranged an interesting pictorial reproduction of a test report which is claimed to be a record in the file manufacturing world. It shows a bar of steel 1 in. square and 6 ft. 2½ ins. long, this being the actual amount of steel removed in the course of the test, with one side only of an S.S.P. file. Such an arrangement cannot help but prove of interest both to file users and merchants, and speaks highly of the quality of the products of the Company. In the tool display are included files, saws, edge tools, turnscrews, carpenters' and wheel nut braces, and clutch discs.

Stewarts & Lloyds, Limited, Broad Street Chambers, Birmingham.

This exhibit comprises wrought iron and steel tubes for the conveyance of gas, water, steam, compressed air, etc., with all the necessary fittings for same, such as are consumed in vast quantities by the foundry industry.

J. B. Stone & Company, Limited, of 135, Finsbury Pavement, London.

Nibbling machines, the standard types, all of which are of much improved design, are being



THE NIBBLING MACHINE.

shown in operation, cutting sheet metal from ⅛-in. to ¼-in. thick. This year they are showing a new pattern which is the smallest size now made. It is intended primarily as a bench machine for use when cutting thin stock up to 14 gauge. The principle of operation, viz., the punch and die, is the same as in the larger machines. It is specially adapted to small work, such as trimming embossed work, duplicating small parts, template making, small stencil or sign cutting, etc. The cutting speed is approximately 60 in. a min.

Thompson Bros. (Bilston), Limited, Bradley Works, Bilston.

As illustrative of their galvanising and annealing plant, this firm is showing an oil painting depicting a sheet galvanising works, comprising sheet annealing covers and stands, automatic roller type sheet galvanising plant, to which is coupled conveyors, washing and drying apparatus, corrugating and curving machines; additionally, samples will be exhibited of all classes of hot-galvanising specimens. A sample "solid welded" steel galvanising bath is also shown. Of particular interest to the foundry and allied industries are electro-plating tanks; electrical switch gear and circuit breaker tanks; stainless steel welded steam jacketed pans; compressed air cylinder; heat-treatment pots, salt baths, hardening, case hardening and annealing pots; shaking barrel; tinning barrel; tinning bath; pressed and welded plate work, and a pressed steel moulding box, etc.

FOUNDRY SUPPLIES.

J. C. Abbott & Company, Limited, Lloyds Bank Chambers, New Street, Birmingham.

This important firm of coke and pig-iron merchants have arranged a section of their exhibit specially to interest foundry owners, and are showing both South Wales (Celtic) and Durham cokes and special cylinder and ordinary foundry iron.

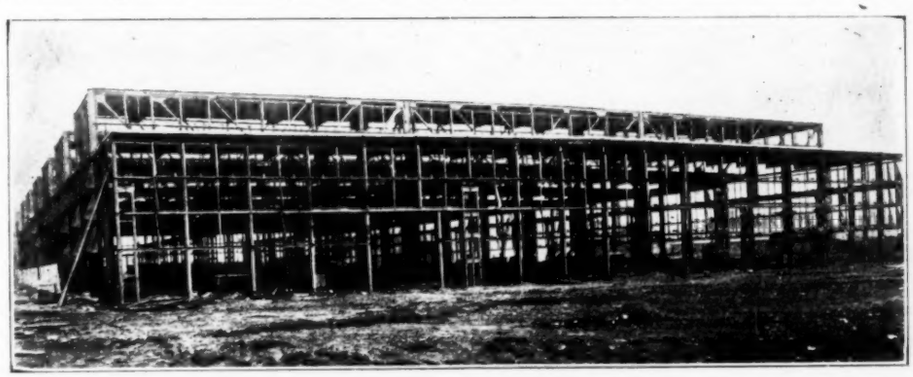
T. J. Priestman, Cupro Foundry, Leopold Street, Birmingham.

This firm is showing their extensive range of alloys which have been so compounded as to render the manufacture of non-ferrous castings to specification a much easier proposition. A new development is being shown by an associated company—British White Lines, Limited—which manufactures the material for traffic regulation by the insertion in the roadway of notices.

Atlas Preservative Company, Limited, Deptford, London, S.E.8.

This exhibit is one of particular interest to those founders concerned with the economic upkeep of plant, buildings, and equipment constructed of iron and steel or timber. Our illustration is of the extension to Leys Malleable Foundry at Derby, which has been so treated. The stand is largely given over to the display of mechanical and other scale models of typical structures treated with "Atlas Ruskilla" iron and steel preservative paint. The claims made for this material are exceptional. It is stated that "Atlas Ruskilla," being truly rust-inhibitive, rust particles present at application—which under ordinary paints are free to develop—are neutralised, and rust-growth thus prevented. It then forms a tough covering which stubbornly resists the effects of acid fumes, steam, extremes of, and rapidly changing temperatures, and bad weather. Being elastic, it does not chip or crack, but expands and contracts with the metal. It dries with a glossy finish. Its covering power—an important factor in comparing costs—is good, a gallon covering approximately 600-800 sq. ft. It is made in black, white and 13 attractive colours, and packed in 1-gall. and 5-gall. drums for foundries, especially in the Dominions.

There is also a very interesting exhibit relating to "Atlas A" wood preservative. This includes a number of timbers used in a test conducted by the Vernacular Forest School, Balaghat, India. These timbers were placed in a Termite (white ant) hill for 15 months. The untreated specimens show plainly the ravages of these insects, whilst the



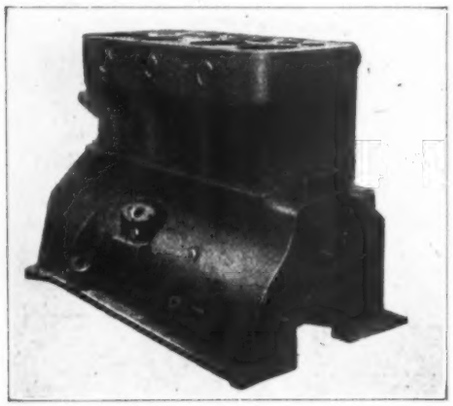
EXTENSIONS TO THE FOUNDRY OF LEY'S MALLEABLE IRON COMPANY, WHICH HAS BEEN TREATED THROUGHOUT WITH "RUSTKILLA."

"Atlas" treated pieces are undamaged. This material not only protects timber from insect attack, but arrests and prevents "dry" and "wet" rot, fungi, etc., hardens and toughens the wood-fibre, and renders the timber extremely fire-resistive. It is very simple to use, elaborate plant and skilled labour being unnecessary. Being highly concentrated, and requiring dilution with water only, it is claimed that "Atlas A" is the "cheapest wood preservative extant." It is made in two grades, "Standard," which is stainless, and "Brown" (a recent development) which imparts to all woods a permanent stain of rich beauty.

Bureau of Information on Nickel, Limited, 2, Metal Exchange Buildings, Leadenhall Avenue, London, E.C.3.

The Bureau of Information on Nickel, Limited, has a stand illustrating the many applications of nickel and its alloys. Nickel alloy-steel, nickel cast iron, nickel brasses and bronzes, nickel copper alloys, ferro-nickel alloys, light alloys containing nickel, malleable nickel and nickel plating are all represented by suitable samples and products.

A special exhibit, arranged through the courtesy of Professor D. Hanson, D.Sc., and Dr. A. B. Everest, illustrates research work on the important



A Nickel Chrome Cast-Iron Cylinder.

new development of nickel cast iron, which is being carried out in the Metallurgy Department of Birmingham University. This exhibit includes photo-micrographs and samples illustrating clearly the effect of nickel on cast iron as well as castings which demonstrate some of the applications of this material. One exhibit of special interest is a cylinder block made of nickel cast iron of the following typical compositions:—Si, 2.35-2.55; Mn, 0.60-0.80; S, 0.08-0.12; P, 0.14-0.18; Cr, 0.35-0.45; and Ni, 1.25-1.35 per cent., which we illustrate.

The application of nickel to brass and bronze also calls for special note. It has been discovered, comparatively recently, that a small amount of nickel in pressure bronzes of certain common compositions aids considerably in improving the density and water tightness of castings made from them. By adding from ½ to 1 per cent. nickel to an alloy containing 85.5 copper, 7 zinc, 5 lead and 2.5 per cent. tin, used for a complicated locomotive lubricator, one manufacturer reduced his casting loss due to rejection for leakage under pressure and other defects by 50 per cent. The Bureau exhibits a nickel-bronze cylinder body casting of this type.

Harper & Moores, Limited, Stourbridge.

All users of firebricks will appreciate the quality and shapes of the specimens exhibited. Of interest to foundrymen are the general utility goods, such as squares, arches, crowns, radial heads and stretchers, etc., which are so largely used to constitute refractory linings for industrial furnaces generally; tiles and quarries, which are used for the floors of muffles or annealing ovens; blast-furnace and cupola linings; and the domestic fireplaces manufactured by them.

Marley Hill Chemical Company, Limited, Milburn House, Newcastle-upon-Tyne.

This firm's well-known much appreciated foundry coke is being shown on the stand of J. C. Abbott & Company, Limited, their agents in the Midlands.

ACTUAL FOUNDRY EXHIBITS.

Allbright Castings, Limited, 20, Cannon Street, Birmingham.

This foundry has specialised on "Allbryte" stainless steel castings, which are shown for the first time by any firm, and include water taps; bathroom fittings; harness and saddlery furniture; casement window fittings; door fittings; name plates; letters and figures; tram, 'bus, motor car, ship and railway fittings; engineering castings for chemical, vinegar, dye and confectionery trades; and many small castings used in the hearth furniture trades.

The composition of the castings is of the high nickel-chromium type, renowned owing to its high resisting qualities to rusting and corrosion through acid and other causes.

Messrs. G. E. Mettham and T. C. Pett are in attendance on the stand.

Edgar Allen & Company, Limited, Imperial Steel Works, Sheffield.

This firm has much interest for our readers as an example of one of the most enterprising firms in the foundry industry and as a supplier of high-class plant and tools for its use. At Birmingham the latter activity is to be stressed, and a model of a drier, which type of apparatus is an essential for the economic production of many classes of castings by providing uniformly dried sand, is to be shown. Taken in the aggregate, the 4,000 odd foundries in Great Britain must use considerable quantities of tool steel, and a firm capable of producing a brand like the new Stag Major high-speed steel—the independent and creditable tests of which will be available at the stand—can obviously take care of the modest requirements of the foundry by providing them with pneumatic and ordinary chisels, files, hack saws and the like.

Derwent Foundry Company (1920), Limited, Derby.

This foundry is exhibiting a range of small grey-iron castings for the motor and general engineering trade. They specialise in small grey-iron castings, all work being done on moulding machines, and it is claimed that the castings strip so finely and true to pattern, and are of such high machinability, that they save much time in the machine shop. All castings are thoroughly sand-blasted. Mr. H. E. Bugg is in charge of the stand.

The Falkirk Iron Company, Limited, Falkirk.

This prominent foundry is showing the finished products of their works in the way of fireplace suites in rustless steel, bronze and other finishes; electric fires and gas cookers; porcelain enamelled baths and kindred appliances.

John Harper & Company, Limited, Albion Works, Willenhall, Staffs.

This well-known foundry is showing fine castings for the electrical and hardware trades which are produced in their Willenhall Works. Special attention has been given to the heat treatment of castings to secure the greatest degree of softness for high-speed machining. An enormous variety of work is produced by this firm, which was established in 1790, and are so well known among users of castings. A novel feature of the stand is the provision of a cinema that purchasers may see the processes in operation at the new works, which were opened in January of this year, and embody many unusual devices for ensuring that accuracy and finish for which the firm is noted.

The Mint, Birmingham, Limited.

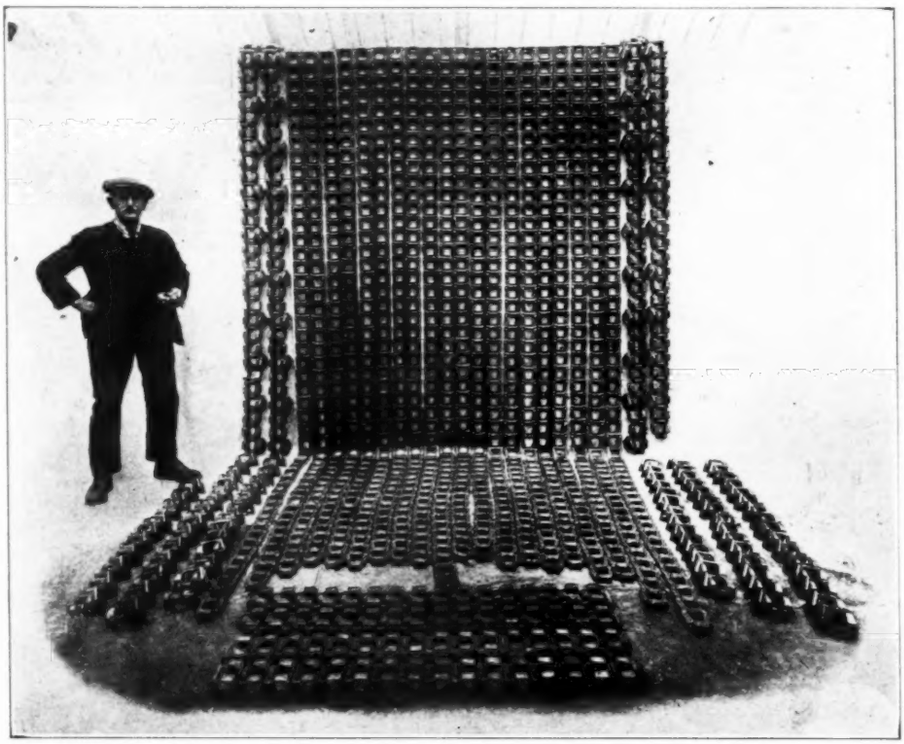
This stand is constructed entirely of cupro nickel, copper and brass tubes with panels of brass and copper sheets. There will be ten columns of assorted tubes supporting the framework.

Moorwoods, Limited, Harleston Iron Works, Sheffield.

This firm's exhibits comprise the following:—Coal, gas, steam, oil and electric cooking apparatus for hotels, restaurants and public institutions; also interiors, dog grates, mantel registers, kitchen ranges, electric cookers and radiators for domestic use. The representatives are Messrs. A. H. Pennington, Messrs. S. W. Ivett and J. B Sneath.

Radiation, Limited, 164-172, Queen Victoria Street, E.C.4.

The following six firms (the oldest in the gas appliance industry) are associated in Radiation, Limited, and the appliances they severally exhibit, while differing in exterior design, process of "finishing," etc., all incorporate very advanced features of construction that have been developed or improved in the Radiation research laboratories:—Arden Hill & Company, Essex Works,



Chains for Salt Conveyors.—G. & J. Weir, Ltd.

This chain is for a Salt Conveyor and is composed of 1,200 links in four different patterns. All these links were cast in the Cathcart foundry in Monel metal, and were not machined before fitting.

Aston, Birmingham; the Davis Gas Stove Company, Limited, Diamond Foundry, Luton; Fletcher, Russell & Company, Limited, Palatine Works, Warrington; the Richmond Gas Stove & Meter Company, Grappenhall Works, Warrington; Wilsons & Mathiesons, Limited, Carlton Works, Armley, Leeds; and John Wright & Company, Essex Works, Aston, Birmingham.

The Radiation firms will each have on the stand examples of their products, consisting of gas cookers and gas grates in various new finishes. Hot-water circulators, geysers, radiators, gas irons and various other appliances in which gas is used for both domestic and commercial purposes, for cooking, heating, and hot-water supply.

G. & J. Weir, Limited, Cathcart.

It is evident from the wide range of fabricated products here displayed that Monel has won definite recognition at the hands of many manufacturers. This non-ferrous nickel alloy metal is quite apparently in a class by itself—rustless; verdigris-proof; corrosion resistant to all alkalies and to a wide range of acids; stronger than mild steel, and keeps a great proportion of its strength at elevated steam temperatures, besides resisting the cutting action of superheated steam. Moreover, it is an "amenable" metal, lending itself readily to mill and workshop practice.

We illustrate on the previous page a recent application, which will show our readers how extensive is the gamut of service performed by this natural high-grade nickel alloy in the industrial field to-day.

A fact that undoubtedly contributes to the growing appreciation of Monel metal is the wide range of sizes in which rods and sheets are available, and the variety of engineering forms in which it is immediately available. The photograph on page 116 will give some conception of this important point.

The stand is in charge of Lt.-Commander G. W. Goddard, R.N.

ALLIED INDUSTRIES.

Earle, Bourne & Company, Limited, Heath Street South, Birmingham.

This firm are showing cold rolled brass, of various alloys, and copper; solid drawn brass and copper tubes for locomotives, condensers, sugar refineries, engineering, plumbing, etc.; brazed brass and copper tubes, plain, ornamental, round, square, oval, flat, twisted, reeded, etc.; polished and lacquered cased tubes for bedsteads, shop fittings, etc.; angles, channels and sections; shop-front mouldings in brass, copper, bronze, nickel silver, etc.; handrails in brass, copper and bronze; mouldings and tubes for fenders and hearth furniture; nickel silver sheet, strip and tube; bends in square brass, round cased tube, and nickel silver; copper bends for sanitary, plumbing and heating trades; light copper tubes for domestic water service.

H. H. Vivian & Company, Limited, Icknield Port Road, Birmingham.

The following is a brief description of this important exhibit:—Solid drawn brass condenser tubes; solid drawn admiralty mixture tubes; solid drawn cupro-nickel 80/20 condenser tubes; solid drawn brass tubes for general engineering purposes in various sizes up to 6 in. diameter; solid drawn copper tubes up to 6 in. diameter; solid drawn copper locomotive tubes, also brass; solid drawn copper tubes for domestic water service supply, etc.; rolled brass sheets and strip; rolled copper sheets; rolled nickel silver in sheets and strip; brass wire; copper wire; high conductivity copper strip, tape, busbars and sections for electrical purposes, and nickel silver wire.

(To be continued.)

THE RAILWAY RATES TRIBUNAL have prescribed the procedure to deal with the granting of new exceptional rates for which the consent of the Tribunal is required. The Court will sit on February 13, March 12, April 23, May 21, June 18, July 30, October 15, November 19, and December 17, to consider all such proposed exceptional rates as may be submitted to them. The Tribunal will also sit on March 26, July 23, and October 22, to determine any questions that may be brought before them as to the alteration of the classification of merchandise, or the alteration of the classification of any article not at the time classified, or any question as to the Class in which any article is classified.

Slow Motion Controllers for Foundry Cranes and Hoists.

BY C. H. S. TUPHOLME.

Direct-current slow-motion controllers are arranged to give creeping speeds in both directions of motion, and are specially designed for use with electrically-driven cranes and hoists, particularly in foundries. A high starting torque is obtained on the first notch, with very sensitive control at the lower speeds. In cases where slow motion is obtained by means of single cylinder controllers, the first two or three points are usually arranged for diverter control, followed by series resistance points to bring the motor up to full speed. When stopping, however, if the handle is returned quickly to the "Off" position, a heavy braking current may occur when passing from the series to the diverter points and cause arcing on the commutator of the motor.

This disadvantage is overcome in the latest types of controller by using two cylinders, a small auxiliary cylinder being provided to obtain creeping speeds by diverter control, in addition to the main cylinder for ordinary series speed regulation. The two cylinders are connected and mechanically interlocked so that the diverter circuit cannot be opened until the main cylinder is in the "Off" position.

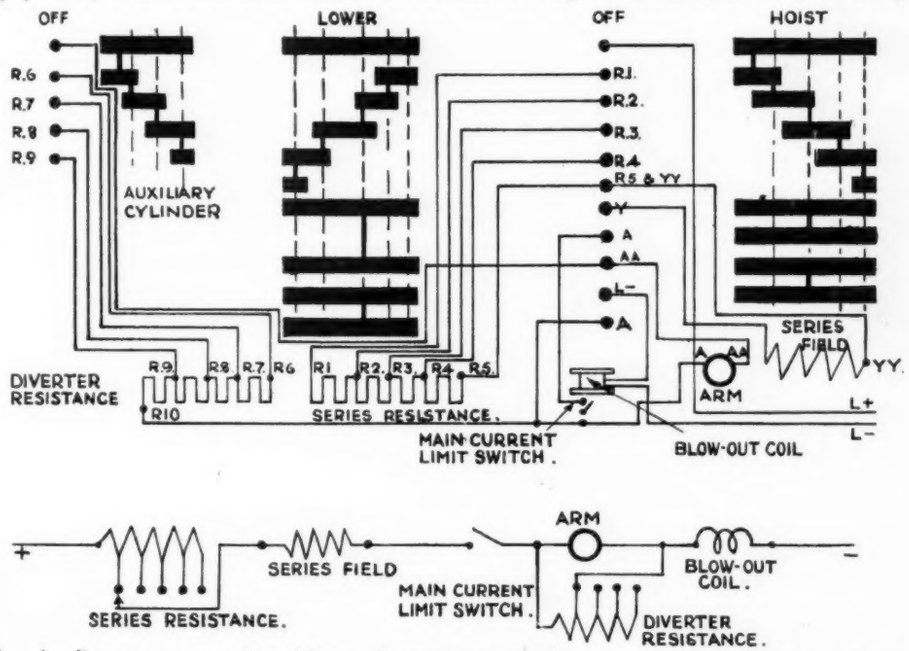


FIG. 1.—CONNECTIONS FOR SLOW-MOTION CONTROLLERS FOR FOUNDRY CRANES (COURTESY BRITISH THOMPSON-HOUSTON COMPANY, LIMITED).

The connections of such a controller are shown in the diagram (reproduced by courtesy of the British Thomson-Houston Company), and are such that the motor is started for normal speeds by operating the main cylinder. If a creeping speed is required, both cylinders are brought into use, the auxiliary cylinder being first set on one of the four slow-motion points, and the main cylinder then moved to either the first or the second point, forward or reverse.

The two cylinders are mechanically interlocked to give the following conditions:—

(1) When the main cylinder is moved from the "Off" position for normal hoisting, the auxiliary cylinder is securely held in its "Off" position and cannot be moved until the main cylinder is returned to the "Off" position.

(2) When slow motion is required and both cylinders are in the "Off" position, the auxiliary cylinder is first of all moved to points 1, 2, 3 or 4, according to the speed required. When the auxiliary cylinder is in use, the movement of the main cylinder is limited by an interlocking mechanism to two points, forward or reverse. Under normal loads creeping speed is obtained on the first point; but if the load be too heavy, the motor may not start until the main cylinder is moved to the second point, thereby allowing more current to pass through the armature.

(3) The auxiliary cylinder cannot be moved back to the "Off" position until the main cylinder has been returned to its "Off" position, so that arcing cannot be caused by opening the diverter circuit.

It will thus be seen that where such a type of controller is used creeping speed is optional, and if normal speed is required at any time there are no diverter points to be passed through first, as is the case with a single cylinder controller. When creeping speeds are required, the combination of four diverter and two series points makes possible an extremely fine adjustment of speed. On returning the main cylinder to the "Off" position in order to stop the motor quickly, no injurious arcing occurs on the commutator.

Resistances for use with slow motion controllers are designed for intermittent duty and suitable for starting-up against full load torque. They are five-minute rated in accordance with the B.E.S.A. recommendations for crane service. This five-minute rating allows two minutes on the first step, equal pauses on the other steps, five minutes for the whole starting period, and ten minutes' rest, the cycle repeated indefinitely with lesser periods in proportion. The basis of this rating is the ratio of the running to the cooling periods. For crane service, the frequency of starting and stopping is found to be much greater than that indicated by the B.E.S.A. rating, but the five-minute rating on this basis is found to be satisfactory for the heaviest crane service.

Professor Turner Testimonial Fund.

We are requested to announce to the subscribers to the above fund, which has been raised under the joint auspices of the Institute of British Foundrymen and the British Cast Iron Research Association, that owing to Professor Turner's departure for a prolonged visit to Australia in the course of a few days, it has been found impossible to make a formal presentation in the immediate future.

A cheque representing the bulk of the subscriptions received has been forwarded to Professor Turner, and upon his return from Australia it is hoped that an opportunity will be found to formally confirm the presentation and present a small medallion or a similar gift as a permanent record of the esteem and good wishes of the subscribers.

XUM

Electrolytic Iron.

Notes on Its Manufacture, Properties and Uses.

By a Chemical Engineer.

Until comparatively recently the purest commercial iron was of Swedish origin, and contained as much as 99.8 per cent. of iron. A commercial product known as "American ingot iron" is now manufactured, which the makers claim to contain 99.94 per cent. of iron. This iron is, of course, obtained molten, and, therefore, cast after removal from the furnace.

Iron, or, rather, very low carbon steel, of a high degree of purity is also produced by refining in electric furnaces. But iron has been obtained in relatively large quantity, by electrolytic deposition of a degree of purity exceeding 99.9 per cent., and often reaching 99.98 per cent. iron. It was in 1910 that the industry was started on a large-scale basis. In that year a company called "Le Fer" was formed at Grenoble (France) to acquire the licence that had been granted to a Mr. Boucher by Mr. S. Cowper-Cowles to manufacture tubes and sheets of iron by electrolytic means.

Preparation of Electrolytic Iron.

The process of the company, "Le Fer," was as follows:—Revolving cathodes were used in a neutral solution of iron salts, maintained in the neutral state by the circulation of the liquid over the surface of the iron. The electrolyte was ferrous chloride, and the anodes are of cast iron. The bath received periodic additions of a depolarising medium, such as oxide of iron, the object of which was to eliminate, at least in part, the hydrogen deposits on the cathode, which injuriously affect the material if present in too large a quantity. It is possible to work with a current of high density, even 1,000 amperes per square metre, and obtain an iron of excellent quality. The thickness of iron deposited per hour with 10 amp. per sq. ft. is 0.000564 in., and it requires 1,770 hours to deposit 1 in. in thickness. Using any pig-iron in solution, an iron can be obtained having (after removal of the gases by annealing) the following composition:—Carbon, 0.004; silicon, 0.007; sulphur, 0.006; and phosphorus, 0.008 per cent.

The cathode in this process is a revolving mandrel upon which the iron is deposited, thus forming a tube. The metal after deposition is very brittle, due to occluded hydrogen, so that it is annealed to eliminate this gas, stripped from the mandrel, and used as a boiler tube, either with or without drawing through a die. In this process the principal item is the cost of cast iron for anodes, which must be of a reasonably high grade so as to avoid undue pollution of the electrolyte and deposition of impurities on the cathode. There is also about a 20 per cent. loss from the anodes due to the formation of slimes, and there is the cost of electric power.

Eustis-Perin Process.

Observing that the use of a soluble anode results in loss as slimes and necessitates a good solid material such as cast iron, which is comparatively costly, F. A. Eustis and C. P. Perin have developed a process which renders cast-iron anodes unnecessary, and utilises instead an ore solution which is depleted of its iron by electrolysis in the ordinary way, but using insoluble anodes, *e.g.*, graphite. The main point is to keep the iron solution up to the requisite standard iron content so that deposition can proceed at the same rate with the same current density. The electrolyte used in this process is ferrous chloride, and a current density of 50 amp. per sq. ft. is employed. The iron may be deposited in the form of a tube upon a rotating cathode, or as sheet or as crumbs or small particles upon a travelling belt of conducting material, from which the iron particles are mechanically removed outside the vats.

The advantages of this process are sufficiently obvious; any cheap ores capable of solution in cheap acids may be used; coal for smelting is not required. So long as electric power is available, the process may, therefore, be worked. The cheapest raw material is the abundant sulphide ore, occurring in many localities, and often sold at very low price; these ores, on account of their sulphur content, cannot be used for blast furnace smelting until after desulphurisation in roasting furnaces. A common and useful ore in this connection is pyrrhotine, magnetic pyrites, or pyrrhotite. It often contains nickel, sometimes up to 5 per cent., and is then also valuable as a source of that metal.

After separation of as much lime and magnesia as possible, the ore is finely ground and leached with ferric chloride from the anode components, the process thus being continuous. Separation of calcium oxide and magnesium oxide is necessary to avoid waste of chlorine in leaching, and fine pulverisation assists in the leaching process by shortening the time factor. The electrolyte in the baths is well agitated so as to keep its iron content constant throughout and to ensure smooth, compact deposits.

Properties of Electrolytic Iron.

The material is hard and brittle on removal from the electrolytic bath, due to interstrain and occlusion of gases, particularly hydrogen. The iron in this state has a Brinell hardness of 193 using a 10 mm. ball and 3,000 kg. load. The microstructure is entirely obliterated by annealing at from 800 to 900 deg. C., when it is replaced by the characteristic structure of a pure metal, *i.e.*, polygonal grains. An annealing period of 10 min. in a salt bath at 900 deg. C. is sufficient for complete recrystallisation. After a complete anneal the iron shows a Brinell hardness of 90.

Tensile tests made by the National Tube Company on tubes made at Grenoble, in the condition as received, showed a tensile strength of 27.6 tons per sq. in. with an elongation of 12 per cent. on an 8-in. gauge length. After re-drawing and annealing at 900 deg. for 20 min., the iron showed a tensile strength of 17.4 tons per sq. in., and 30 per cent. elongation. The iron is very soft and ductile after annealing, so much so that, according to Escard, it is the regular practice at Grenoble to draw five times through a die without annealing. This represents a great saving in cost of annealing which with ordinary soft steel is necessary before each successive draw.

The tubes will withstand considerable pressures; thus a tube, 100 mm. diameter, 0.75 mm. thick, was permanently but evenly deformed under 1,200 lbs. pressure per sq. in., but no cracks were formed. Regarding corrosion, tests made at the Massachusetts Institute of Technology show that wrought-iron pipe corrodes nearly twice as much, and Shelby steel tubing 2.6 times as much as electrolytic (Eustis) iron in the atmosphere.

According to Hughes, electro-deposited iron is likely to be subject to certain defects which must be guarded against by makers and users; these include: pin holes, lumps or roughness, inclusions of foreign matter, cracks and quasi-cracks. But these defects arise from causes which can be largely eliminated by efficient control and conduct of the deposition process.

Uses of Electrolytic Iron.

The three principal industrial applications of electrolytic iron are the manufacture of tubes, of sheets, and of iron for fusion—as for the manufacture of ferrous alloys. The manufacture of iron welding rods and electro-magnets also form important uses.

The manufacture of boiler tubes is advantageous by this process because drawing is eliminated or reduced to a minimum cost, and the thinnest walls which are the most costly to produce on the drawbench are the cheapest to manufacture electrolytically. Furthermore, a uniform wall thickness is obtained. The sheet metal is eminently suitable for the production of deep stampings, drawings or spinnings. As a raw material for fusion the iron will certainly compete with Swedish iron; the brittleness in the state before annealing is an advantage in this direction, allowing as it does of ready fracture into small pieces.

An ingenious application for electrolytic iron is that of the Western Electric Company, who required iron of high purity in finely powdered form for the manufacture of electro-magnet cores. The material is, therefore, crushed and compressed in dies to the form of magnet cores which, on account of the separation of individual metallic particles, have a high electrical resistance. At the plant of the Western Electric Company the electrolyte employed is ferrous sulphate and chloride and ammonium sulphate; the anode is mild steel and the cathode polished steel sheets from which the deposited iron is periodically stripped; a current density of 12 amp. per sq. ft. is employed. There are obviously an almost infinite variety of articles now made from steel sheet or other metals as stampings or pressings for which electrolytic iron would be more suitable on account of deeper drafts being possible.

Tin in Spain.

The increased demand for tin throughout the industries of the world is leading to the exploitation of many tin fields which have laid fallow for centuries. In the last few weeks arrangements have been made to exploit known stanniferous areas in South Africa, an alluvial field only sixteen miles from Cape Town, close to the Kuils River deposits. The French banks are interested in the exploitation of a new field in Indo-China, where tin has been worked for centuries.

But the most important recent development is the proposed exploitation of the Spanish alluvial tin fields by an English group. Mining engineers with great experience in Malaya have already arrived in Spain in order to carry out searching tests into the standard of the alluvial tin deposits known to exist there.

Early Discoveries.

What part the Spanish tin mines will play in the future it is impossible to say. But that tin has existed in Spain since the early days of history is well known.

Possibly amongst the earliest discoveries of tin by the ancients were the deposits in the North-West Province of Spain, called by the Romans "Gallacci" and known to-day as Galicia. These deposits were worked both by the Phœnicians and by the Romans after the capture of Spain in the Punic Wars. Since that period they have not been worked on any great scale, although British capital has, from time to time, been invested in them.

In the old days the tin obtained from this part of Spain was all lode tin. The ancient town of Orense, the capital of the Galician province of the same name, is the centre of the industry, and the country is scored and bored with many indications of the enterprise and energy of the Roman and Punic miners. Beariz, a little village in the mountains of Balcova, is situated on a hill that is tunnelled with Roman workings in what is probably the richest stanniferous deposit in the richest tin district in Spain. Enormous quantities of the mineral from this mine alone must have rewarded the labours of the pioneers.

Almost Pure Tin.

The stanniferous areas of Spain are enormous, and the area of the alluvial tin-bearing deposits, practically sixty square miles in extent, produces the very highest grade of tin concentrates. These concentrates have, at various times, been analysed by mineralogists in London, and have been shown to be carrying from 75 to 99.5 per cent. of pure tin.

The Phœnicians and Romans who worked the tin lodes of Galicia entirely neglected these alluvial deposits. Perhaps they had no satisfactory method of washing the soil, and therefore depended for the metal entirely on the lode mines.

More remarkable still, every succeeding generation which tried to develop the tin industry in Spain also passed over these deposits. If, and when, they can now be developed, Spain will come very near to heading the list of the tin-producing countries of the world.

Notes on Oil Sand Mixtures.

Before the West Yorkshire Branch of the Institute of British Foundrymen, on January 14, at Bradford Technical College, under the chairmanship of Mr. W. Parker (Sheffield), an address under the title of "Some Further Notes on Oil-sand Mixtures," was given by Mr. W. West, of Leyland, Lancashire. Mr. West illustrated his remarks by a series of lantern slides, giving diagrams, graphs and pictures, and subsequently also by a cinematograph film showing oil-sand mixtures in course of use in the production of automobile cylinder parts. There was also a display, on a large table, of products made in oil sand.

Mr. West's talk was quite impromptu, but based on previous addresses on the subject by him to other branches in the light of further observations and experiments in the use of oil-sand mixtures. He admitted that his experiences were concentrated on motor cylinder and similar light castings, but he hoped and believed that something could be learned by the general foundryman on broad principles as experienced in that kind of work. He remarked at the outset that the moulding sands in which these light motor castings were produced were a matter of great importance and the peculiar shapes and intricate design of the cylinder head, in particular, called for special attention from the point of view of sand mixtures. His firm, after careful consideration of the value of sands for their purpose, had laid themselves out for oil-sand castings production. To deal successfully and most efficiently with oil sands, he remarked, it was necessary to go the full extent and lay out the plant and get a full working knowledge of the mixtures and their behaviour in relation to castings. Mr. West said the castings he showed on the pictures had been produced entirely in oil-sand mixtures. Perhaps there might arise in the mind of some gentlemen present the question of cost in comparison with production in green sand or dry sand. They might feel that on costs they would save by using green or dry sand, but he thought he could probably surprise a good many people by the remarkably low figure at which some of the castings shown could be produced in oil-sand mixtures. Such a sand mixture reduced cost, for instance, by the use of unskilled labour. Whilst he would not claim that as a matter of general production it was cheaper than any other sand, he would stress the point that the mere fact of using oil sand did not necessarily mean higher cost.

He wished to deal from two points of view with the green-bond strength. They had passed the time, of course, when just purely oil and sand were mixed together. That was excellent for certain kinds of work and also very cheap, but when one was dealing with a core that had to stand up to anything up to 10 inches one required something of a green-bond strength. Secondly, he would like to deal with the treatment of the mixture in its preparation, and thought it would be generally convenient to deal with the second aspect of the matter first. There were on the market several types of mixtures and the individual foundryman was left to pick and choose the one that appealed to his fancy. In the matter of green-bond strength, Mr. West said he had found that one could get a good mixture by making it in the old type of mortar mixer. They needed an intimate connection of the binding material with the sand grains themselves. He showed on the screen, by means of a graph, examples of results in three different types of mixtures in three different types of machines. They were: sand without rosin; sand with rosin; and coarse-jacket sand—in, paddle mixer; Simpson mixer; and mortar mixer. He impressed the necessity, when seeking information, of making the test strictly fair in all respects. Time and other factors in the test were closely watched to see that no incorrect results were obtained and be misleading; and it must be remembered that it was from a basis of comparative results rather than particular figures that they could get most help and guidance. He showed tables illustrating the effects of milling on the grain size of various oil-sand mixtures, showing to what extent too much milling or grinding would break up the sand grains and render the sand inefficient. From the tests made, Mr. West said he was satisfied that there was no material reduction of grain size in the mortar mill. The great thing that mattered was that core makers would pass a paddle mixed sand to get at a mortar-mill mixed sand because it was so much better for standing up on work than were the other sands.

Other points were dealt with which have been covered by Papers from the author already printed in the JOURNAL.

The cinema film illustrated the making of the four cylinders for the Leyland engine—the Leyland "Lion" cylinders. The audience saw motion pictures of moulds and cores for the "Lion" cylinder body being assembled, the pouring in of the metal, jigging of the fettled casting, and the casting ready for despatch; assembling of moulds and cores for the "Lion" cylinder head; multiple castings in oil sand; castings unfettled; chassis packing pieces; the making of the pistons for "Trojan" engines (mould made in green sand with oil sand cores); casting of the "Trojan" pistons; and other features of work done at Leyland.

DISCUSSION.

The PRESIDENT (Mr. W. Parker), inviting discussion, remarked that they had been fortunate in hearing a particularly interesting talk, illustrated extremely fully by pictures and drawings and actual specimens. They know they could expect something very interesting from Mr. West, and they had not been disappointed.

Elimination of Coring Preferred.

MR. W. G. THORNTON (of Bradford) said he was afraid he was not very competent to discuss oil-sand cores to any extent because he did not use them much, but they all looked on Mr. West as an expert on this matter and they believed that what Mr. West did not know about oil-sand cores was hardly worth knowing. (Hear, hear.). The first thing that struck him (Mr. Thornton) on looking at the specimens exhibited was the block of the cylinder body, and quite frankly he thought it was rather the wrong way round. Mr. West had explained that cost was not everything in this line of work, but he (Mr. Thornton) thought a decent moulding machine would produce similar castings at half the cost. No doubt, however, the firm responsible for making these things exhibited had their own good reasons for considering this other method better for their own particular purpose. Personally, he did not use cores if he could avoid them. Mr. Thornton said it would be very interesting to know what did Mr. West do with his used sand. If, as he understood Mr. West to say, they did not use it again, they must surely accumulate a great quantity of used sand unless they had some very good means of disposal. Mr. Thornton said he had noticed, when he was experimenting with cores, some variation in size. He supposed it was the regulation of temperatures that kept all the cores made in Mr. West's products of the exact size to fit the way they had to do, and also, of course, the regulation of the mixture.

Dealing with Used Core Sand.

MR. WEST, replying to Mr. Thornton, said at Leyland they did not use any sand over again. They were fortunate in being so near to Southport, from where they got the sand, that it came into their works very cheaply, and it would not pay to use the old sand again. The second good reason why they did not use the sand over again was that they were able to sell their old sand at nearly the price it cost them to get new. (Laughter.) There was no shortage of demand for their old sand, so it must be very good for something after they had finished with it. If one was in a favourable position to use entirely new sand it did away with much trouble. The cores were cleaner and much better altogether; but he could well imagine that anyone not within easy reach of new sand cheaply would want to use old sand, and there was no reason why they should not use, say, half and half new and old. In regard to keeping the size of core constant, Mr. West said they had had trouble in that regard formerly, especially in the smaller sizes of core, but they found that they got no variation when the temperature was kept consistently at about 250 deg. C. The mixture had no water. If there was water there would be subsidence of the core in drying, which would supply one reason for the difference in size mentioned. For any particular type of core that had to stand any considerable height, they made a definite allowance at Leyland for subsidence in the drying process. They might get variation in consequence of the man rapping lightly or heavily, but the core-makers became accustomed to the particular job they had to do, so that at Leyland now the variation in cores was very slight indeed. He entirely agreed that it was a very important factor, and in cylinder-making the whole secret of the block was position. They had several mixtures which they used for different types of core in different positions.

The Fume Trouble.

MR. F. BERRY (of Halifax) asked whether in using oil sands there were not objectionable fumes in the casting, which were liable to cause trouble among the men. He remembered some years ago some men who left employment because of the smell. In regard to the use of new sand and old, Mr. Berry said he thought there would be a big saving of boxes to put against the cost of new sand.

MR. WEST replied that, in regard to smell, a great deal depended on just what was used. Such things as fish oil, he agreed, were very bad. So far as there were any fumes in the oils used at Leyland, it had to be recognised that if they were not driven off in the core then they had to be driven off in the foundry, but the taking of the temperature was an important point. Most text books spoke of about 200 deg. C. At Leyland the temperature reached 250 deg., and that extra 50 deg. made a remarkable difference in driving off the smell of oil. Furthermore, the roof of their foundry was very high and they were not bothered by smell in the foundry, though probably if they did not bake their cores to the high temperature which they did they would have more smell. They had ventilators in the roof which took away the smell from the core ovens. So far as concerned the saving of the boxes, the box at Leyland was very useful when they needed only a few of a particular cylinder, and they did not have to go to the expense of buying special boxes to make a few cylinders.

Reclamation of Used Core Sand Deemed Useless.

MR. S. W. WISE (Bradford, Hon. Secretary of the Branch) remarked that great credit was due to Mr. West for the very considerable trouble he had taken in getting that lecture together, and its ample illustrations. Mr. Wise said he was inclined to agree with Mr. Thornton that it needed a good deal of special reason to justify the increased cost of these expensive sands. In the average foundry the men were not always particular about the waste of a little sand, but if they wasted half a cwt. of an expensive sand for every casting it was going to be costly, and there must be considerable justification for the use of such a material. Mr. Wise expressed the opinion that it was impossible to use up old oil sand again with satisfaction. Personally he could not satisfactorily use old oil sand alone, and he did not like to use it mixed with new sand.

Rosin Additions and "Creeping."

He had been very much interested in Mr. West's observations about rosin. He had indicated the green bond strength he obtained on a certain figure. As he went further, suggested Mr. Wise, Mr. West would no doubt have noticed the "creeping" that took place in the use of rosin. His (Mr. Wise's) experience with rosin as mixture by itself was that the cores, when hot, were very difficult to handle without distortion, which of course in such delicate work as motor cylinders was a matter of vital moment. There was also a

chance of other "creeping" on the plates, so that it was difficult to keep the size, and he thought they must be very careful as to the amount of rosin that was put in. In the general foundry, where they were accustomed to the use of shovel and trowel, they were not so very familiar with close measurements. In regard to the mixing of the sand, Mr. West bore out his (Mr. Wise's) own experience in that one could not find out in practice that the milling had any material effect on the size of the sand grains, whatever may be found in scientific tests. Mr. Wise said he wondered whether Mr. West thought it was better to make the piston, from the point of view of the cost, in a block or to make them singly. Personally, he rather thought it was better to make them in smaller numbers and weighted instead of the top being rammed up. He was inclined to wonder whether it was quite so accurate to make cores four in a box as it was to make them singly. The tilting of a box of four cores would suggest there were risks of distortion.

Cost of Sea Sand.

Mr. West, in reply, said he had not carried the experiment of using old sand very far, so he could not give any very correct idea as to how it behaved in the mixture. From what he had seen other people use he should think one did not get the same type of core: not so hard, for instance. That was one thing peculiar to the carbon in it. The carbon would not take up the oil and act as a sand grain. For precision, using new sand was better than any old sand. In regard to cost, it depended on what one was using. Some mention had been made of expensive sands costing 1s. per cwt. The sand used at Leyland did not cost that, but only 7d.—quite a considerable saving when large quantities were being used. Mr. West said he would like to correct any impression that may be in anybody's mind that at Leyland they used a pure oil and rosin mixture. He would not recommend that to anybody. It did, as Mr. Wise had said, "creep," and there would be difficulty in getting it out of the box. The experiment was carried out to find its behaviour with oil. That gave a better idea how to blend it. So far as cylinder work was concerned, he believed they had quite a long way to go yet and that they would still find better and cheaper methods. In regard to the mixing of the sand, he had been severely criticised by certain writers to the technical Press on the question of milling of sand. He could only think his critic had followed a particular type of mixer that he had mentioned, from its infancy to its present position, and his view-point was from there, hence he (Mr. West) questioned whether it was strictly correct in that degree. The old milling method did give some good mixtures, and a little bit of weight did good so far as concerned the mixture and green bond. Balancing up the fact that at Leyland they did not produce some of these cylinder parts in their thousands, but only in one or two hundreds at a time, the question of cost was not so bad. In regard to casting of "Trojan" pistons and planning out eight in a box, it must be remembered that the piston was very thin in section, and they felt that by eight in a box they might get the advantage of any heat in this manner. As to risk of distortion in carrying the cores, the man—as had been shown on the pictures—had no distance to carry them. He had merely to turn round and put them in a wheeled rack behind him.

Importance of Baking.

Mr. W. H. Poole (Keighley) remarked that Mr. West's address conveyed a good many very important lessons for the average foundryman. In using oil-sand cores the trouble was that so many men would wrongly bake them. The importance of the temperature on the condition of the working of the stuff was not as fully appreciated by the average foundryman as it should be. Mr. Poole said he could see trouble for anybody who tried to make productions of this type on the old-fashioned core stove. He had seen foundrymen baking the cores in the old-fashioned type of oven and wondering that they did not get the result such as they saw in Mr. West's work that evening. Mr. Poole asked whether Mr. West thought there was any difference in making a mould from old sea-sand cores, as against that from a dry-sand core, in regard to chilling effect; and as to whether there was any appreciable difference in the running of the metal. In the production of high-class cores there was no doubt at all that the pattern-making was itself a fine art. Many people, he felt, would consider the cost of these boxes unless there was a large production in prospect. He thought the multiple method of castings should appeal to many foundrymen. It was not as much used by the average foundryman as it might be, to very great advantage.

Stoving Details.

Mr. West, replying, remarked that the introduction of enough oxygen to supply the demands of linseed oil in its drying required the introduction of extra air beyond that which came through the firebricks, and at Leyland they had a secondary supply of air. It was a very important point to have enough oxygen. One found no difference between the use of an oil-sand mould and a dry-sand mould, because in the latter they gave a face of blacking, and they could not improve on it. In regard to rosin and sand, in drawing the pattern from the sand there was the effect of an imprint springing to the surface of the fine sand and water. In using rosin they got a very smooth surface. That was transferred to the casting. One got that from a dry mould just the same. When one turned out the core with rosin, if there was too much rosin one got it sticky, but if the blending was right that would air-dry itself and the piston could be taken up and moved. Rosin took oxygen from the air and caused the mould to have a dry skin. Pattern-making, Mr. West agreed with Mr. Poole, was a matter on which great credit should be paid to the pattern-makers. On this kind of work the pattern-making was most exact and the final result depended very much on the metal and the core box. In regard to multiple casting, he did not think that could be described as anything new. It had been tried long ago in green-sand moulds. He did not know how they did it in that, because one could not get a very big lift, and if one did manage to make them on top of each other there was considerable risk of sagging; but certainly the multiple method was not new. In case anybody should get an idea that at Leyland they had run wild on oil sand, he would mention that all the results that had been seen that evening had been done in spare time as experiments, because they were interested in the matter.

The Future of Rosin Additions.

Mr. J. G. Robinson (Halifax) said one question raised had not, he thought, been perhaps fully answered, and that was in regard to using up old sand. He (Mr. Robinson) had used tons of it, and he thought it might be said that they could take at least one-third of old sand and use it in with the new mixture with advantage. Where railway carriage had to be paid on sand purchased that effected a big saving and it had no detriment to the cores. In regard to the milling, some people strongly criticised the old mortar mill type of grinding sand, but he thought there was no detriment whatever in its use for oil sand. It did not spoil the core, and undoubtedly one got a far better strength. In regard to fumes, he had noticed that where old sand was used there was nothing like the amount of smell one would ordinarily expect. The smell was driven out in the core oven, and the fact of raising it to the high temperature had no doubt a good deal to do with it. There had been criticism in The Foundry Trade Journal about rosin being a "back number," but personally he did not agree.

On the motion of Mr. Whitaker (Bradford), seconded by Mr. H. Somersgill (Bradford), a hearty vote of thanks was awarded Mr. West for his lecture.

Mr. West, replying, said it must always be remembered that circumstances of one shop were not necessarily those of another, and mixtures entirely satisfactory to one may not be found so good in another. At Leyland they would be glad to give any further information if any member interested should wish to see their practice there. (Applause.)

Random Shots.

That hardy annual, the British Industries Fair, will soon be with us again. After the usual preliminary announcements about novel exhibits, and extra space booked, and new exhibitors, and proposed royal visits, it will be interesting to see what it is really like. There seems every reason to anticipate an interesting event with plenty of activity by way of accompaniment, for however cautious we may be either by instinct or as the outcome of painful experience it cannot be denied that there are plenty of significant straws about nowadays, even if the wind be still but a very gentle breeze.

* * *

And talking of trade activity, one of the most striking of recently published facts is that of the increase of coal output, which has apparently gone up by one million tons per month over a period of three months—a state of affairs which requires no comment save the expression of a hope that it will long continue.

* * *

Those of us who had been hoping, silently or vociferously, according to our dispositions and to the depth of our feelings (or perhaps the size of our incomes?) that the income tax was really going to come down at last, have had our dream rudely shattered by the Chancellor of the Exchequer's recent announcements. At the same time, however, we are informed of an official desire to reduce the burden of local rates on industry—presumably on the principle of the swings and roundabouts. . . . Would it be unkind to suggest that the sum total of these assurances is something to this effect—that we had better reconcile ourselves to losses on the swings by remembering that as soon as there are any gains about we shall make them on the roundabouts instead?

* * *

The latest innovation in theatre-land seems to be the reproduction of a greyhound race on the stage of a Paris music hall. Our hearts go out to the poor dogs, who have now to run without getting anywhere in addition to chasing a hare that can never be caught and would not be worth the catching in any case. . . . But at the same time greyhounds are not the only victims of some such revolving wheel process—what about those of us who go on patiently travelling round the country to attend dinners of this, that, and the other institution at awkward times and still more awkward places? Even the most gluttonous of free diners, even the most complacent of post-prandial bores, has to find consolation by this time in the thought that February is nearly over . . . what he forgets is that there is always another winter season not very far ahead, and a not entirely dinnerless spring and summer sandwiched in between. . . .

* * *

And in this connection, the Staffordshire Iron and Steel Institute recently held a dinner which was its sixty-second annual event of the kind . . . we are reminded at once of that body's long and distinguished history and of the short span into which the entire development of the iron and steel trades has been compressed. The connection and the contrast were alike emphasised by the presence at the dinner of a descendant of the original Abraham Darby. . . .

* * *

It would, as a matter of fact, not be untrue to say that Staffordshire taught the world how to make iron. In or near that area originated the smelting of iron with coke, the founding of iron, and the puddling process. Moreover, Staffordshire men have carried their knowledge and skill literally to the four quarters of the globe. . . . These historical connections are the more interesting because in many cases they have been sustained unbroken until the present day, the firms in many instances bearing or incorporating the original names of their pioneer ancestors. . . .

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Trade Talk.

AN OUTBREAK OF fire at Sir W. G. Armstrong, Whitworth & Company's works at Scotswood, last week, caused considerable damage.

THE IRON ORE SHIPMENTS of the Swedish Grängesberg Company in January, 1928, totalled 486,000 metric tons, as against 665,000 in January, 1927.

THE EMPLOYEES OF J. & R. Wallace, The Foundry, Castle Douglas, were entertained by the firm on the occasion of the celebration of the fiftieth anniversary of the formation of the firm.

THE EIGHTY-SEVENTH annual exhibition and trial of implements of the Royal Agricultural Society of England will be held at Nottingham from Tuesday, July 10, to Saturday, July 14.

CLAYTON WAGONS, LIMITED, have an order for six units of their patent steam rail coach specially designed to suit the particular requirements of the Great Southern Railways of Ireland.

THE STANDARD INDUSTRIAL TRUST has just acquired the whole of the share capital of the Broughton Copper Company. The agreed price is £102 for debentures, £1 for each £1 preference share and £3 5s. 6d. for each £1 ordinary share. The deal involves a total sum of £1,039,000.

BOLCKOW, VAUGHAN & COMPANY, LIMITED, of Middlesbrough, recently secured a contract through the Crown Agents for the Colonies for 100,000 pressed steel sleepers for the Nigerian Railway. These are required to relay the permanent way track from Ibadan to Offa, and the total weight of steel used in executing the contract will be 5,280 tons.

THE GRINDING AND PULVERISING OFFICES OF INTERNATIONAL COMBUSTION, LIMITED, 11, Southampton Row, London, W.C., announce orders recently received, including twelve for England, one for Ireland, six for France, and one for the Federated Malay States. These orders are for Hardinge mills, classifiers, Raymond mills, Hum-mer screens, and Impax pulverisers.

SEALED TENDERS FOR THE purchase of Workman, Clark & Company's shipyard at Belfast will be opened on February 29 by the joint receivers at 6, Clement's Lane, Lombard Street, London, E.C. Some 1,241 shares of £10 each in the Cyclops Foundry and Patternmaking Company, Limited, Glasgow, are included in the offer for sale. This foundry was owned by the Belfast firm which supplied it with castings for many years.

THE WOODALL-DUCKHAM VERTICAL RETORT AND OVEN CONSTRUCTION COMPANY (1920), LIMITED, have received orders from the Lowestoft Water and Gas Company for a T.I.C. tar treatment plant, having a capacity of 10 tons of crude tar per 24 hours, for the production of Road Board specification residues, and from the Hawick Gas Company for a bitumen melting and mixing plant to work in conjunction with an existing tar plant.

THE UNITED STEEL COMPANIES, LIMITED, have announced that it is impracticable, in present circumstances, to raise the amount required to redeem the £1,016,300 of unsecured 6 per cent. obligations which fall due for payment on April 19 next, and, further, that the dividend guaranteed by the company and due on March 1 next on the £1,500,000 of 8 per cent. cumulative preference shares of the United Strip & Bar Mills, Limited, will not be paid.

AT THE LONDON BANKRUPTCY COURT, on February 3, a sitting was held for the public examination of Mr. F. G. Martin, metal merchant and agent, who carried on business at 148½, Fenchurch Street, E.C., under the style of Stedman Crowther & Company. The debtor, who filed his petition on July 26, 1927, returns total liabilities £73,919 (unsecured £59,421) and net assets valued at £11,556. In reply to Mr. E. Parke, Official Receiver, debtor stated that in 1911 he became a partner in the business of Stedman Crowther & Company, then being carried on in London, Liverpool and Manchester. His partner retired in September, 1919, under terms whereby witness agreed to pay him for his capital £41,752, by half-yearly instalments of £1,000 with 5 per cent. interest on the outstanding balance, and an annuity of £1,000. Witness paid the instalments up to July, 1926, but then defaulted in his payments, and in consequence his late partner issued a writ and obtained judgment for the balance owing. He continued the metal merchant's and broker's business, but in July, 1926, suffered a severe loss through the failure of a client to meet his obligations; as a result he was called to pay about £33,000 for differences, and to pay that sum he had to borrow money. He attributed his insolvency to his liability to his late partner under the deed of dissolution, to losses by speculation on the produce markets, to the failure of clients to meet their obligations, to lack of capital, and to heavy overhead charges. The sitting was adjourned for the debtor to amend the accounts in certain particulars.

Personal.

MR. J. BURNS BISHOP, hitherto with Stothert & Pitt, Limited, of Bath, has been appointed chief technical engineer to the Birtley Iron Company, Limited, of Birtley, Co. Durham.

MR. W. R. HANN, Mr. Llewellyn J. Davies, Mr. C. L. Clay, and Mr. J. H. Duncan have been elected to the committee of the British Engineering Standards Association and Fuel Research Committee dealing with the analysis and sampling of coal.

SIR HUGH BELL, vice-chairman of Dorman, Long & Company, Limited, who went out to the Soudan in December to be present at the opening of the new bridge over the Nile at Omdurman, and the new 10-mile electric tramway service between Khartoum and Omdurman, has returned to this country.

MR. R. M. WOLVIN has resigned the presidency of the British Empire Steel Corporation. His place is taken by Mr. C. McNaught, of Toronto, while additions to the board include Sir Herbert Holt, Mr. J. H. Gundy, Mr. C. Duggan, Mr. C. Montgomery and Mr. W. Wilder. These changes follow the purchase by Wood Gundy interests of the Dominion Steel Corporation's dollar bonds. The latter company is controlled by British Empire Steel. The purchase of the bonds was made at 87½ plus interest, or 1 point above the price offered by the London Preferred Committee.

MR. W. SHIPMAN, who has retired from the South Durham Steel & Iron Company, Limited, after service extending over half a century at Stockton and West Hartlepool, was the recipient at the latter place on Saturday last of a handsome gold watch and a wallet of notes from the workmen and officials. Mr. Shipman's service with the company includes 24 years as assistant works manager at West Hartlepool. The presentation was made by Mr. T. Williams, works manager, West Hartlepool, and tributes were also paid by Messrs. W. Astley Barton (assistant secretary), J. Whittaker, R. Atkinson, D. Daniels and H. Salmon.

MR. J. M. ALLAN, who went to Sheffield from Newcastle in 1913 to be managing director of the Sheffield and Penistone Works of Cammell, Laird & Company, Limited, and whose retirement from the position was announced only a few weeks ago, has been made a Justice of the Peace for Sheffield. Mr. Allan was managing director of Hawthorn, Leslie & Company's Marine Engineering Works at Newcastle. Another appointment held by Mr. Allan has been that of chairman of the Midland Railway Carriage & Wagon Company, Birmingham, and he is also a member of the Cutlers' Company and of the Sheffield Chamber of Commerce. Other additions to the Commission of the Peace include Mr. P. B. Brown, managing director of Hadfields, Limited, Sir George Thomas Buckham, chief ordnance designer and a director of Vickers, Limited, Mr. George Clark, governing director of the North British Steel Works and the Middlewood Rolling Mills, Oughtibridge; Mr. David Flather, who was the last Master Cutler, is the managing director of the firm of W. T. Flather, Limited, Standard Steel Works, Sheffield, which was founded by his grandfather in 1817; Mr. J. H. W. Laverick, managing director of the Tinsley Park Colliery, Sheffield, and also associated with other colliery undertakings; and Mr. James Neill, chairman of James Neill & Company, Limited, Composite Steel Works, Sheffield.

Wills.

FROBISHER, J., a director of Edward Foster & Son, brassfounders, Halifax £2,591

FOSTER, W. H., of 53, Savile Park Road, Halifax, brassfounder, of G. Foster & Son £21,256

WILLIAMS, G. O., Sheffield, a director of Williams Bros. (Sheffield), Limited, engineers and brassfounders £9,835

Reports and Dividends.

Kerr, Stuart & Company, Limited.—Brought forward, £29,741; profits, £25,083; interest on bank loan and depreciation, £22,699; carried forward, £32,125.

Scottish Iron and Steel Company, Limited.—Dividend, 3 per cent. on ordinary shares; additional dividend on preference, 1 per cent., making 7 per cent. for year, both less tax.

Steel Developments, Limited.—Profit, £5,147; brought in, £2,842; total, £7,989; interim dividend, 3 per cent., tax free, £2,247; balance, £5,742; final dividend, 3 per cent., tax free, making 6 per cent. for year; carried forward, £3,196.

Contracts Open.

Abingdon. — Ironwork, etc., for year ending March 31, 1929, for the Town Council. The Borough Surveyor, The Abbey House, Abingdon.

Belfast, February 18.—(7) Steam, gas and water tubing, ironmongery and galvanised wire; (14) cast-iron street box frames and covers; (16) lighting, feeder and section pillars; (18) copper cable connectors and solder; (19) electricity meters and instrument transformers; (23) transformers; (24) electric cables and joint boxes; (26) V.I.R. electric cables, wires and flexibles, for 12 months, commencing April 1, for the Electricity Committee. Mr. F. H. Whysall, city electrical engineer and general manager, East Bridge Street, Belfast.

Darlington, March 10.—Iron and steel ware (including cogs, nails, etc.), cast-iron pipes, miscellaneous castings, etc., for six months ending September 30, for the Corporation. The Borough Surveyor and Waterworks Engineer Town Hall, Darlington.

Hull, February 20.—Cast-iron pipes and special castings, sluice valves, and virgin pig lead, for the Town Council. Mr. W. D. Bingham, water and gas engineer, Guildhall, Hull.

Leeds, February 21.—(17) Cast-iron nameplates and letters, etc., during year ending March 31, 1929, for the Highways Committee. Mr. E. W. Cockerlyne, highway surveyor, 155, Kirkstall Road, Leeds.

London, S.W.19, February 24.—(6) Sewerage ironwork, for alternative periods of six and 12 months from April 1, 1928, for the Merton and Morden Urban District Council. Mr. C. J. Mountifield, clerk, 126, Kingston Road, Merton, S.W.19.

London, W.3, February 29.—(1) Iron and steel from April 1, 1928, for 12 months, for the Acton Town Council. Mr. J. Morgan, town clerk, Municipal Offices, Acton, W.3.

Norwich, February 24.—Iron, cast-iron gullies, manhole covers, etc., for one year ending March 31, 1929, for the Corporation. Mr. J. S. Bullough, city engineer, Guildhall, Norwich.

Pontefract.—Supplying and laying 1,600 yds. of 3-in. cast-iron water mains, complete with valves, hydrants, etc., for the Pontefract Rural District Council. Messrs. D. Balfour & Son, civil engineers, 3, St. Nicholas Buildings, Newcastle-on-Tyne. (Fee £2, returnable.)

Rawtenstall, Lancs, February 20.—Iron castings, for the Corporation. The Borough Surveyor, Town Hall, Rawtenstall.

Southend-on-Sea, March 1.—Iron castings, during 12 months from April 1, 1928, to March 31, 1929, for the Corporation. Mr. R. H. Dyer, borough engineer, Southend-on-Sea.

Swansea, February 18.—Cast-iron pipes and specials, waterworks appliances, including valves, hydrants, etc., water meters, etc., for six or 12 months from April 1, 1928, for the Town Council. The Water Engineer and Manager, Guildhall, Swansea.

Watford, March 1.—(1) Ironwork, etc., for 12 months, for the Corporation. Mr. W. W. Newman, borough engineer, Watford.

Withernsea, February 21.—Cast-iron spigot and socket water pipes (22 tons 9-in., 129 tons 6-in., and specials 4 tons), for the Rural District Council. The Surveyor, Municipal Buildings, Withernsea.

Obituary.

MR. TREVELYAN THOMSON, M.P. for Middlesbrough West, died last week. A native of Tees-side, Mr. Thomson was a son of Mr. T. J. Thomson, iron founder, of Stockton. Early in life he became associated with the Sheffield Smelting Company, and later joined his father in the business of iron founders and merchants in Middlesbrough.

MR. JOSEPH KIRKPATRICK SMITH died last week at his home, Machon Bank, Sheffield, after a long and serious illness. He was 78 years of age. The late Mr. Smith was a native of Annan, Dumfriesshire, and went to Sheffield when only 20 years of age to take up a position with John Fowler (Don Foundry), Limited. He rose to become a director of the firm, and only ill-health compelled his retirement in 1924, after having been associated with it continuously for 55 years.

MR. WALTER BORRIE has died at Scarborough after a long illness. The deceased was for many years connected with the firm of Blair & Company, Limited, marine engineers. The deceased gentleman, who was 64 years of age, started his career at Blair & Company's works under his uncle, Mr. G. Y. Blair, one of the founders of the concern, and he eventually became managing director. He retired in 1920, and three years ago, on account of his failing health, he went to live at Scarborough.

Telegrams:
"Refractory, Sheffield."

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"SCOTLAND'S BEST"—

WORMIT RED MOULDING SAND IS EQUAL TO ANY RED SAND USED IN SCOTLAND, WHETHER OF ENGLISH, SCOTTISH OR IRISH ORIGIN.

It is milled ready for use.

Free sample bags on application.

General Refractories Co. Ltd.

SHEFFIELD.

GLASGOW—58, York Street (*Telephone 1511 Central*).

Iron and Steel Markets.

Pig-Iron.

MIDDLESBROUGH.—It is satisfactory to note that the steady improvement previously reported in the conditions of the Cleveland iron market continues well maintained, while the relighting recently of additional furnaces in the district is a fairly accurate indication of approaching expansion of production. The fact that home demand is increasing is convincingly evidenced in the diminution of the heavy stocks of pig-iron accumulated in makers' yards, and, should the export trade develop in like proportion, further all-round improvement in business cannot reasonably be long delayed. It is now evident that buyers are convinced that prices have reached the lowest levels possible in existing conditions, and in the circumstances consumers are encouraged to enter into forward commitments on a more extensive scale than has recently been experienced. The bulk of current business passing is, however, for February-March delivery, although some contracts were reported lately to have been fixed up for June, and there are said to be inquiries for even later periods. Current quotations remain unchanged as follow:—No. 1 Cleveland foundry, 67s. 6d.; No. 3 G.M.B., 65s.; No. 4 foundry, 64s.; No. 4 forge, 63s. 6d. per ton.

In the market for East Coast hematite, export demand shows some slight improvement, Italian and German consumers having made substantial purchases of late, while a more active business can be reported on home account. Prices are a little firmer at 70s. per ton for East Coast mixed numbers, with an extra 6d. per ton for No. 1 quality. On the North-West Coast, Bessemer mixed numbers are still nominally quoted at 70s. per ton at furnace.

LANCASHIRE.—Foundries in this area are still insufficiently supplied with orders to justify heavy purchases of pig-iron in advance, and business in the local markets is mostly confined to consumers' more immediate requirements. Meanwhile, current values keep fairly steady. Derbyshire iron for delivery Manchester or equal distance being on offer at from 72s. to 72s. 6d. per ton, Staffordshire at round 72s., Cleveland at about 78s. 2d., Scottish from 87s. 6d. upwards according to brands, and West Coast hematite iron at from 84s. 6d. to 85s. per ton.

THE MIDLANDS.—Very little improvement was in evidence at Birmingham market last week, at all events as concerns the demand for foundry pig, which remains dull and inactive. Prices are about as previously quoted, Northamptonshire makers holding out for 60s. at furnaces for No. 3 foundry. Northants silky pig-iron is offered at 59s., Derbyshire at 64s. to 64s. 6d. at furnaces. North Staffordshire iron is quoted also at the Derbyshire levels. Lincolnshire is on offer at 72s. 6d. per ton, delivered, and No. 3 Scotch round about 90s. per ton, delivered.

SCOTLAND.—Business in the Scotch pig-iron market is slow and of very little volume. The prices are unchanged on the basis of 70s. per ton for No. 3 foundry, f.o.t. furnaces. It is possible that here and there a maker may be tempted to take less, but undoubtedly there is an attempt being made to stabilise the price at about to-day's level.

Finished Iron.

Market movements in most classes of manufactured materials continue practically stationary, with many of the bar mills only working on partial time, and makers anxious to obtain fresh orders. In Lancashire and the Black Country there is keen competition for business for crown and cheaper grades of iron, and orders for good quantities are very scarce. The makers of marked bars are in a better position, and on the whole conditions are showing signs of improvement in this brand. In regard to prices, crown bars are offered at prices varying from £9 5s. to £10 10s., and nut and bolt quality at about £9. Marked bars remain unaltered at £12 10s. at makers' works. Foreign iron, No. 3 quality, is dearer, and present quotations are in the neighbourhood of £6, delivered works in this area.

Steel.

At Sheffield slightly more activity is reported in the steel market, with a better demand for acid billets and a steady call for some classes of basic billets at unchanged prices. Good orders are coming in for special steels, but the position in regard to open-hearth quality is less satisfactory, with a number of furnaces still out of commission in this district. With regard to high-speed steel, it is asserted that in the face of Continental competition some producers are selling below the Association prices in order to secure business. Some of the armament sections here are fairly busy, and a number of orders for shells have come to hand. Foreign billets, 2 in. and up, are quoted at £5 11s., blooms at £5 3s. 6d., and sheet bars at £5 12s. per ton, delivered to works in the Midlands. The tinplate market continues quiet, and the volume of business done has been small. The majority of the works are busy, and have a fair amount of business on their books. Prices are steady.

Scrap.

Conditions in the principal markets for scrap metals continue somewhat irregular as concerns foundry material, but in the Midlands there is a fairly good demand for cast-iron borings at 55s. per ton delivered, and cast-iron scrap is still firm. For heavy machinery cast-iron scrap, in cupola sizes, 70s. to 72s. 6d. per ton delivered is asked, according to quality. There is not such a good demand for light cast-iron scrap, which is weak at 52s. 6d. per ton delivered. In Scotland the demand for all classes of cast-iron scrap is maintained, particularly for heavy ordinary quality in pieces not exceeding 1 cwt. at 64s. to 65s. per ton, and for the same class of material in furnace sizes around 62s. 6d. to 64s. per ton. Machinery cast-iron scrap, suitable for foundries, is also fairly well sought after, and is firm at 70s. per ton. Old cast-iron railway chairs are quoted 68s. 6d. per ton. Light cast-iron scrap is unchanged at 57s. 6d. per ton. The above prices are all per ton delivered f.o.t. consumers' works.

Metals.

Copper.—Consequent upon reports of a substantial decline in stocks in warehouse in this country, values of warrant copper have been well maintained, although at the week's close there were slightly lower quotations both for cash and forward account. The disparity between domestic and export prices in New York has called forth many complaints on this side, as it is claimed that American consumers are able to buy copper rods at the same price which European manufacturers are compelled to pay for the raw material.

Official closing prices of standard copper have been as follow:—

Cash: Thursday, £61 17s. 6d. to £61 18s. 9d.; Friday, £61 18s. 9d. to £62; Monday, £61 13s. 9d. to £61 15s.; Tuesday, £61 18s. 9d. to £62; Wednesday, £62 5s. to £62 3s.

Three Months: Thursday, £61 10s. to £61 11s. 3d.; Friday, £61 10s. to £61 11s. 3d.; Monday, £61 6s. 3d. to £61 7s. 6d.; Tuesday, £61 11s. 3d. to £61 12s. 6d.; Wednesday, £61 17s. 6d. to £61 18s. 9d.

Tin.—Movements in standard tin during the last week have disclosed a further serious decline in values, slumping at one time to £236 per ton, the lowest level touched for several years. Afterwards the market rallied a little, but closed at £238 5s. (three months) and £236 for cash. Apart from a good deal of liquidation, the decline is regarded as due to expectations of a bigger production this year, accompanied by a decline in American absorption. So far there is no tangible indication of either, though there are repeated reports of hidden stocks of tin. It is in view of the latter that the recent somewhat mysterious increase in the arrivals at Liverpool warehouses is assuming an importance it would not otherwise.

Official closing prices of standard tin have been as under:—

Cash: Thursday, £238 to £238 2s. 6d.; Friday, £233 to £233 2s. 6d.; Monday, £227 15s. to £228; Tuesday, £231 5s. to £231 10s.; Wednesday, £229 to £229 5s.

Three Months: Thursday, £240 2s. 6d. to £240 5s.; Friday, £235 5s. to £235 7s. 6d.; Monday, £230 to £230 5s.; Tuesday, £233 15s. to £234; Wednesday, £231 10s. to £231 15s.

Spelter.—The recent decline in values of ordinary spelter has been due more to the lack of action on the part of producers to form an Association than to anything else. In fact, during the past two weeks the metal has been rather more active, and at times substantial buying has been in evidence. There has been rather more inquiry also from galvanisers, and some further improvement may be anticipated.

The following are the week's prices:—

Ordinary: Thursday, £25 17s. 6d.; Friday, £25 18s. 9d.; Monday, £25 13s. 9d.; Tuesday, £25 15s.; Wednesday, £25 13s. 9d.

Lead.—The market for soft foreign pig, in the absence of support and with less inquiry from consumers, has been subjected to liquidations and bear selling, with the result that prices became easier. In the opinion of one merchant firm, with active support withdrawn, the market has been less artificial, and, with sellers mostly predominating, prices have declined sharply.

The week's prices are appended:—

Soft foreign (prompt): Thursday, £20 16s. 3d.; Friday, £20 7s. 6d.; Monday, £20; Tuesday, £20 5s.; Wednesday, £20.

Strength of Cast Iron at Very Low Temperature.

Some interesting tests have recently been carried out by the British Oxygen Company, Limited, on the tensile strength of cast iron at the temperature of the boiling point of liquid air (— 194 deg. C.). The test bars, 14 in. long and 1 in. diameter, were turned down at one end with a 2-in. parallel of 0.564-in. diameter. The results of the test at low temperatures and of a similar bar at atmospheric temperature are given below:—

	Tensile strength. Tons/sq. in.	Elongation on 2-in. Per cent.	Brinell No.
Atmospheric temperature ..	13.32	0.167	235
Liquid air temperature ..	13.04	0.167	235

The chemical analysis of the cast iron was:—T.C., 3.30; C.C., 0.52; Gr., 2.67; Si, 2.25; Mn, 0.45; S, 0.10; and P, 1.2 per cent. There was no apparent difference in the appearance of the fractures of the two bars.

Pure copper and mild steel were also tested. In the case of the latter the elongation was reduced from 23.5 per cent. to 4 per cent., and the fracture was extremely brittle in appearance, like a white iron.

Iron and Steel Production.

The National Federation of Iron and Steel Manufacturers in their Statistical Bulletin for December report that the number of blast-furnaces in operation at the end of December was 149, a net decrease of six since the end of November, nine having ceased operation and three having been blown in during the month. There has thus been a continuous decline in the number of furnaces in operation since the end of April, when 189 furnaces were blowing. The production of pig-iron in December amounted to 559,100 tons, compared with 575,900 tons in November: the December production brings the total production of pig-iron for the year up to 7,293,600 tons, compared with 2,458,200 tons in 1926, when production was curtailed on account of the coal stoppage, and 6,261,700 tons in 1925. Steel production in December amounted to 604,900 tons, the decline of 93,800 tons being largely due to the Christmas holidays. The December production brings the total for the year up to 9,098,900 tons. The production thus slightly exceeds the output of 1920 (9,067,300 tons). The steel output for 1927 has only twice been exceeded, namely, in 1917 and 1918.

Mr. M. W. Zeman, sales manager of the Osborn Manufacturing Company, Cleveland, Ohio, is at present on the Continent, and will be visiting England in the near future.

British Empire Steel Corporation.—A report from Ottawa states that plans for the rehabilitation of the British Empire Steel Corporation were materially advanced last week, when, after a meeting in Montreal of the directors of the British Empire Steel Corporation and its subsidiaries, the Dominion Iron and Steel and the Nova Scotia Steel and Coal Companies, it was announced that Mr. Roy M. Wolvin, the president of the Corporation, whose management had been severely criticised, had resigned and had been succeeded by Mr. C. B. McNaught, of Toronto.

Service

"A Quality for every requirement" is something more than a mere slogan. It is part of the Bradley service. A wide range of irons to suit all purposes is always in stock and despatch can be guaranteed within 24 hours. Delivery can be made within a reasonable radius by lorry.

After years of research and experiment a number of special qualities have been standardized to ensure perfect mixtures for particular work.

The smaller foundrymen will appreciate the value of these standard grades in the saving of time and the elimination of all doubt in the results of the castings.

Bradley's will be pleased to have enquiries from all foundrymen requiring a special analysis to give perfect results.

Bradley's

PIG IRON

"A QUALITY FOR EVERY REQUIREMENT"

BRADLEY & FOSTER LTD. BF DARLASTON, STAFFS.

WEEKLY PRICE CURRENT.

COPPER.

	£	s.	d.
Standard cash	62	5	0
Three months	61	17	6
Electrolytic	66	10	0
Tough	65	0	0
Best selected	65	5	0
Sheets	92	0	0
India	77	0	0
Wire bars	67	0	0
Do. February	66	15	0
Do. March	66	15	0
Ingot bars	66	15	0
H.C. Wire rods	71	5	0
Off. av. cash, Jan.	61	18	11 1/32
Do. 3 mths., Jan.	61	15	0 31/32
Do., Sttlmnt., Jan.	61	18	10 1/16
Do., Electro, Jan.	66	16	1 7/16
Do., B.S., Jan.	66	4	8 3/32
Aver. spot price, copper, Jan.	61	18	11
Do., Wire bars, Jan.	67	1	1 1/4
Solid drawn tubes			13d.
Brazed tubes			13d.
Wire			9 1/2d.

BRASS.

Solid drawn tubes	11 1/2d.
Brazed tubes	13 3/4d.
Rods, drawn	10 1/2d.
Rods, extd. or rlld.	7 1/2d.
Sheets to 10 w.g.	10 1/2d.
Wire	9 1/2d.
Rolled metal	9 1/2d.
Yellow metal rods	7 1/2d.
Do. 4 × 4 Squares	8d.
Do. 4 × 3 Sheets	8 1/2d.

TIN.

	£	s.	d.
Standard cash	229	0	0
Three months	231	10	0
English	228	10	0
Bars	235	5	0
Straits	233	15	0
Australian	231	15	0
Eastern	231	15	0
Banca	233	15	0
Off. av. cash, Jan.	253	6	5 1/32
Do., 3 mths., Jan.	252	5	1 1/16
Do., Sttlmt., Jan.	253	6	4 1/16
Aver. spot, Jan.	253	6	5

SPELTER.

	£	s.	d.
Ordinary	25	13	9
Remelted	25	10	0
Hard	20	0	0
Electro 99.9	30	0	0
English	26	2	6
India	21	10	0
Zinc dust	33	0	0
Zinc ashes	8	10	0
Off. aver., Jan.	26	1	9 3/32
Aver., spot, Jan.	26	2	6

LEAD.

	£	s.	d.
Soft foreign ppt.	20	0	0
English	21	10	0
Off. average, Jan.	21	19	10 3/32
Average spot, Jan.	21	15	5 3/32

ZINC SHEETS, &c.

	£	s.	d.
Zinc sheets, English	35	0	0
Do. V.M. ex whf.	33	0	0
Rods	41	15	0
Boiler plates	30	10	0
Battery plates	32	0	0

ANTIMONY.

	£	s.	d.
Special brands, Eng.	64	10	0
Chinese	45	0	0
Crude	37	0	0

QUICKSILVER.

	£	s.	d.
Quicksilver	21	7	6

FERRO-ALLOYS AND STEEL-MAKING METALS.

	£	s.	d.
Ferro-silicon—			
25%	8	17	6
45/50%	12	17	6
75%	20	10	0
Ferro-vanadium—			
35/40%	14/3 lb. va.		
Ferro-molybdenum—			
70/75% c. free	4/11 lb.		
Ferro-titanium—			
23/25% carbonless	11 1/2d.		
Ferro-phosphorus, 20/25%	£17	15	0
Ferro-tungsten—			
80/85%, c. fr.	1/3 1/4 lb.		
Tungsten metal powder—			
98/99%	1/7 1/2 lb.		
Ferro-chrome—			
2/4% car.	£32	12	6
4/6% car.	£22	12	6
6/8% car.	£22	7	6
8/10% car.	£22	5	0
Ferro-chrome—			
Max. 2% car.	£35	7	6
Max. 1% car	£41	5	0
Max. 0.70% car	£53	0	0
70% carbonless	1/1 lb		
Nickel—99% cubes or pellets	£175	0	0
Ferro-cobalt	9/3 lb.		
Aluminium 98/99%	£105	0	0
Metallic chromium—			
96/98%	2/11 lb.		
Ferro-manganese (net)—			
76/80% loose	£13	10	0
76/80% packed	£14	10	0
76/80% export	£13	0	0
Metallic manganese—			
94/96% carbonless	1/10 lb.		

Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

	£	s.	d.
Finished bars, 14% tungsten	£0	2	6
Finished bars, 18% tungsten	£0	3	0

Per lb. net, d/d buyers' works.

Extras—

Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under 1/4 in. to 1/2 in.	3d. lb.
Do., under 1/2 in. to 3/8 in.	1/- lb.
Flats, 1/2 in. × 1/4 in. to under 1 in. × 3/8 in.	3d. lb.
Do., under 1/2 in. × 1/4 in.	1/-lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

Scrap from high-speed tool steel—

Scrap pieces	3d.
Turnings and swarf	1d.

Per lb. net, d/d steel makers' works.

SCRAP.

South Wales—	£	s.	d.		£	s.	d.
Hvy. steel	3	0	0	to	3	2	6
Bundled steel and shrngs.	2	14	0	to	2	18	0
Mixed iron and steel	2	14	0	to	2	15	0
Heavy cast iron	2	18	0	to	3	0	0

Good machinery for foundries 3 0 0 to 3 2 6

Cleveland—	£	s.	d.		£	s.	d.
Heavy steel					2	12	6
Steel turnings					2	8	6
Cast iron borings					2	3	0
Heavy forge					3	12	6
Bushelled scrap					3	2	6
Cast-iron scrap	3	2	0	to	3	6	0

Lancashire—							
Cast-iron scrap					3	5	0
Hvy. wrought					3	2	6
Steel turnings					2	2	6

London—Merchants' buying prices delivered yard.

	£	s.	d.		£	s.	d.
Copper (clean)					50	0	0
Brass (clean)					38	0	0
Lead (less usual draft)					18	0	0
Tea lead					15	0	0
Zinc					17	0	0
New aluminium cuttings					75	0	0
Brazier copper					46	0	0
Gunmetal					46	0	0
Hollow pewter					165	0	0
Shaped black pewter					125	0	0

PIG-IRON.

(f.o.t. unless otherwise stated.)

	£	s.	d.		£	s.	d.
N.E. Coast—							
Foundry No. 1					67/6		
Foundry No. 3					65/-		
Foundry No. 4					64/-		
Forge No. 4					63/6		
Hematite No. 1					70/6		
Hematite M/Nos.					70/-		
N.W. Coast—							
Hem. M/Nos. d/d Glas.					83/-		
,, d/d Birm.					87/-		
Midlands—							
Staffs. common*					—		
,, No. 4 forge					62/6		
,, No. 3 fdry.	64/-	to	65/-				
Shrops. basic					—		
,, Cold blast, ord.*					—		
,, ,, roll iron*					—		
* d/d Birmingham.							
Northants forge					—		
,, fdry. No. 3					60/-		
Derbyshire forge					60/-		
,, fdry. No. 3	64/-	to	65/-				
,, basic					—		
Scotland—							
Foundry No. 1					—		
,, No. 3					70/-		
Hem. M/Nos.					74/-		
Sheffield (d/d district)—							
Derby forge					64/-		
,, fdry. No. 3					67/6		
Lincs. forge					64/-		
,, fdry. No. 3					66/6		
E.C. hematite					82/6		
W.C. hematite					85/-		
Lincs. (at furnaces)—							
Forge No. 4					—		
Foundry No. 3					—		
Basic					—		
Lancashire (d/d eq. Man.)—							
Derby forge					—		
,, fdry. No. 3					72/3		
Northants foundry No. 3					—		
Dalzell, No. 3	100/-	to	102/6				
Summerlee, No. 3	87/6	to	94/-				
Glengarnock, No. 3	87/6	to	94/-				
Gartsherrie, No. 3	87/6	to	94/-				
Monkland, No. 3	87/6	to	94/-				
Coltness, No. 3	87/6	to	94/-				
Shotts, No. 3	87/6	to	94/-				

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£	s.	d.		£	s.	d.
Bars (cr.) nom.	9	5	0	to	10	10	0
Angles					—		
Tees to 3 united ins.					—		
Nut and bolt iron					9	0	0
Hoops					12	10	0
Marked bars (Staffs.) f.o.t.					12	10	0
Gas strip					12	0	0
Bolts and nuts, 2 1/2 in. × 4 in.					15	5	0
Steel—							
Ship plates	8	2	6	to	8	7	6
Boiler plts.					10	10	0
Chequer plts.					10	5	0
Angles					7	12	6
Tees					8	12	6
Joists					7	12	6
Rounds and squares, 3 in. to 5 1/2 in.					7	10	0
Rounds under 3 in. to 3/4 in. (Untested)					7	15	0
				and upwards			
Flats, over 5 in. wide and up					8	17	6
Flats, 5 in. to 1 1/2 in.					7	17	6
Rails, heavy	8	2	6	to	8	7	6
Fishplates					12	10	0
Hoops (Staffs.)					10	10	0
Black sheets, 24g.					9	17	6
Galv. cor. shts., 24g.					13	0	0
Galv. fencing wire 8g. plain					12	10	0
Billets, soft	£6	0	0	to	6	10	0
Billets, hard					8	2	6
Sheet bars	£5	12	6	to	5	15	0
Tin bars	£5	12	6	to	5	15	0

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	1 2 1/2
Sheet to 10 w.g.	1 3
Wire	1 3 3/4
Rods	1 3
Tubes	1 8 1/2
Castings	1 2

Delivery 3 cwt. free.
10% phos. cop. £40 above B.S.
15% phos. cop. £50 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. CLIFFORD & SON, LIMITED.

NICKEL SILVER, &c.

	per lb.
Ingots for raising	9d. to 1/3
Rolled—	
To 9 in. wide	1/3 to 1/9
To 12 in. wide	1/3 1/2 to 1/9 1/4
To 15 in. wide	1/3 1/2 to 1/9 1/2
To 18 in. wide	1/4 to 1/10
To 21 in. wide	1/4 1/2 to 1/10 1/2
To 25 in. wide	1/5 to 1/11
Ingots for spoons and forks	9d. to 1/5 1/2
Ingots rolled to spoon size	1/- to 1/8 1/2
Wire round—	
3/0 to 10 G.	1/6 1/2 to 2/1 1/2

with extras according to gauge.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2X foundry, Phila.	20.26
No. 2 foundry, Valley	17.25
No. 2 foundry, Birm.	16.00
Basic	18.76
Bessemer	19.26
Malleable	19.01
Grey forge	18.51
Ferro-mang. 80% d/d	100.00
Bess rails, h'y, at mill	43.00
O.-h. rails, h'y at mill	43.00
Bess billets	33.00
O.-h. billets	33.00
O.-h. sheet bars	34.00
Wire rods	42.00
	Cents.
Iron bars, Phila.	2.12
Steel bars	1.85
Tank plates	1.85
Beams, etc.	1.85
Skelp, grooved steel	1.80
Skelp, sheared steel	1.80
Steel hoops	2.20
Sheets, black, No. 24	2.80
Sheets, galv., No. 24	3.65
Sheets, blue an'l'd., 9 and 10	2.10
Wire nails	2.55
Plain wire	2.40
Barbed wire, galv.	3.25
Tinplate, 100 lb. box	$5.25

COKE (at ovens).

Welsh foundry	—
,, furnace	—
Durham and North.	
,, foundry	—
,, furnace	13/9
Other Districts, foundry	—
,, ,, furnace (basis)	12/- to 13/-

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. Cokes	20×14	box	17/10 1/2	
,,	28×20	,,	35/9	
,,	20×10	,,	—	
,,	18 3/4×14	,,	—	
C.W.	20×14	,,	16/10 1/2	
,,	28×20	,,	—	
,,	20×10	,,	—	
,,	18 3/4×14	,,	—	
Terneplates	28×20	—	per box basis f.o.b.	

SWEDISH IRON.

Bars, hammered, £17 10 0 to £18 10 0	
Rolled Ord.	£15 0 0 to £15 10 0
Nail rods	£15 7 6 to £15 15 0
Keg. steel nom.	£33 to £35
Faggot steel nom.	£22 to £25
Blooms, according to quality	£8 to £12
Pig-iron	£5 15 0 to

all f.o.b. Gothenburg.

TUBES AND FITTINGS.
Up to and incl. 6 in.

	Tubes.	*Fittings.*
Gas	67½%	45%
Water	63¾%	40%
Steam	60%	35%
	W.I. 10% extra.	

DAILY FLUCTUATIONS.

Standard Copper (cash).

	£	s.	d.		
Feb. 9	61	17	6	inc.	5/-
,, 10	61	18	9	,,	1/3
,, 13	61	13	9	dec.	5/-
,, 14	61	18	9	inc.	5/-
,, 15	62	5	0	,,	6/3

Electrolytic Copper.

	£	s.	d.		
Feb. 9	66	10	0	No change	
,, 10	66	10	0	,,	,,
,, 13	66	10	0	,,	,,
,, 14	66	10	0	,,	,,
,, 15	66	10	0	,,	,,

Standard Tin (cash).

	£	s.	d.		
Feb. 9	238	0	0	inc.	40/-
,, 10	233	0	0	dec.	100/-
,, 13	227	15	0	,,	105/-
,, 14	231	5	0	inc.	70/-
,, 15	229	0	0	dec.	45/-

Tin (English ingots).

	£	s.	d.		
Feb. 9	240	0	0	inc.	90/-
,, 10	235	0	0	dec.	100/-
,, 13	230	0	0	,,	100/-
,, 14	233	5	0	inc.	65/-
,, 15	228	10	0	dec.	95/-

Zinc Sheets (English).

	£	s.	d.		
Feb. 9	35	0	0	No change	
,, 10	35	0	0	,,	,,
,, 13	35	0	0	,,	,,
,, 14	35	0	0	,,	,,
,, 15	35	0	0	,,	,,

Spelter (ordinary).

	£	s.	d.		
Feb. 9	25	17	6	dec.	3/9
,, 10	25	18	9	inc.	1/3
,, 13	25	13	9	dec.	5/-
,, 14	25	15	0	inc.	1/3
,, 15	25	13	9	dec.	1/3

Lead (English).

	£	s.	d.		
Feb. 9	22	5	0	No change	
,, 10	21	15	0	dec.	10/-
,, 13	21	10	0	,,	5/-
,, 14	21	10	0	No change	
,, 15	21	10	0	,,	,,

Exports of Iron Castings in January, 1928, compared with January, 1927, and 1926.

	January, 1926.	January, 1927.	January, 1928.	January, 1926.	January, 1927.	January, 1928
BUILDERS' CASTINGS—						
Stoves, Grates, etc., Cisterns, Baths, etc., and cooking and washing boilers:—	Tons.	Tons.	Tons.	£	£	£
To Argentine Republic	132	175	186	5,666	5,527	7,282
,, British South Africa	385	319	508	13,063	11,640	16,699
,, ,, India	104	120	223	4,190	6,060	9,588
,, Australia	108	87	104	5,886	4,195	6,345
,, New Zealand	150	277	233	8,823	14,593	11,384
,, Other countries	592	843	928	31,022	41,192	41,714
Total	1,471	1,821	2,182	68,650	83,207	93,012
PIPES AND FITTINGS—CAST—						
To Argentine Republic	422	720	711	5,707	8,693	6,810
,, British South Africa	406	341	346	6,066	7,280	5,612
,, ,, India	730	231	475	8,307	3,846	7,865
,, Straits Settlements and Malay States	4,794	156	2,743	35,191	2,403	23,228
,, Ceylon	420	48	87	4,246	939	1,039
,, Australia	336	229	608	6,032	4,744	7,248
,, Other Countries	4,189	3,338	6,347	60,097	53,799	75,181
Total	11,297	5,063	11,317	125,646	81,704	126,983
HOLLOW-WARE—						
Cast, not Enamelled, and Cast, Tinned	656	416	306	20,555	16,759	11,859
,, Enamelled	87	83	77	9,254	7,753	6,312
CASTINGS, in the rough—						
Iron	97	185	89	4,132	6,305	3,432
Steel	104	81	61	3,252	4,655	3,031

WILLIAM JACKS & COMPANY,
WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.

18, BENNETTS HILL, BIRMINGHAM.

PIG

IRON

SCOTCH, MIDDLESBRO', HEMATITE, BASIC, SPECIALS, &c.

NON-FERROUS METALS

COPPER, TIN, LEAD, SPELTER, ANTIMONY, CHROME ORE.

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ZETLAND ROAD, MIDDLESBROUGH.

SMALL ADVERTISEMENTS.

Notice.

Small Advertisements in this section of the Journal are accepted at the prepaid rate of 6d. per line, first line in capitals counting two, average 6 words per line. Minimum charge for one insertion 3/-

(A remittance should accompany instructions.)

SITUATIONS VACANT AND WANTED.

EXPERT FOUNDRYMAN, open to advise on Cupola practice, Modern Moulding Machine production; machines and plant installed, or existing ones reconditioned; pattern plates designed, etc.; results guaranteed.—Box 592, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOUNDRY MANAGER OR FOREMAN desires position; 20 years' experience in heavy and light, loam, dry sand and green sand, condensing plants, Uniflow and Diesel engines and machine tools; highest references.—Box 626, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

METALLURGIST desires post with Engineering Firm; 20 years' experience, analysis of iron, steel, non-ferrous alloys, fuels, refractories, etc., metallography, heat treatment of steel; accustomed to Foundry control; good organiser.—Address Box 618, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

MOULDER, experienced, general all-round, requires situation where initiative, ability, integrity and hard work will bring fair return and permanency.—Box 612, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

PRACTICAL FOUNDRYMAN, age 34 (leading hand with engineering firm) desires position as Assistant or Foreman; working not objected to; well trained in loam, dry sand, green sand, oil sand and cupola practice; marine, general engineering or jobbing preferred.—Box 614, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

ENGINEERS' PATTERNMAKER. — Old-established Business, East Midlands, finest work, desires responsible man in position to introduce further business, as Sleeping Partner. —Box 606, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

WELL-KNOWN, PRACTICAL FOUNDRY MANAGER desires change; experienced all classes machine tool, engine, turbine, electrical and general castings up to 30 tons, hand and machine; expert in metals and cupola practice; good organiser; good control; modern methods; accustomed piece work and estimating; would entertain offer from Foundry Requisite Firm; age 46 years.—Apply Box 624, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

CHILLED ROLLS, ETC.—Foundry Manager, with many years' experience in the manufacture of Chilled Rolls and various Chilled Iron Castings, desires change.—Box 590, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

WANTED, experienced Green and Dry Sand Moulders; steady work at piece-work rates for good men.—Apply EALING PARK FOUNDRY, LTD., Junction Road, South Ealing, W.5.

PRACTICAL FOUNDRYMAN required by established Oil Firm to act as Representative for Core Oils and Cream; sound experience of core making essential; good terms offered to suitable man.—Box 596, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FINANCIAL.

EXPERIENCED FOUNDRYMAN desires financial assistance in producing Coal Dust, Blackings, Charcoal, Parting Powder, etc., for Foundry purposes; Midlands; good proposition; references given; strictly in confidence.—Box 608, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

MACHINERY.

SAND MIXERS.—New and second-hand. Ask us to quote.—W. BREALEY & COMPANY, LIMITED, Prospect Works, Hawksley Avenue, Sheffield.

WANTED, two No. 2 Britannia Jar-Ram Moulding Machines, one Sand Mixer, one Cupola.—Particulars, condition and price to Box 616, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

TWO JACKMAN SAND-MIXING MACHINES; ball bearings; £5 each for quick sale.—C. TEMPEST, Engineer, 35, Kirkgate, Bradford.

PAIR OF MODERN BONVILLAIN HYDRAULIC MOULDING MACHINES for Sale; one R3, one A3; take boxes 24 in. dia.; practically new; £120 the pair.—Box 628, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOUNDRY PLANT.

ONE 15-TON LADLE, bottom pouring.
ONE 6-ton LADLE, geared for lip pouring.
FOUR MOULDING MACHINES.
THREE FOUNDRY GRINDING MACHINES, radial wall type.
ONE CUPOLA, 21 ft. high, 3 ft. 10 in. dia.; dia. over blast ring, 5 ft. 10 in.

For further particulars and prices, etc., write Box 630, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOUNDRY PLANT.—Owing to the final dismantling of the Collingwood Foundry, North Shields, offers are invited for one Twenty-ton Crane Weighing Machine, by Avery, and one Testing Machine, by S. Dennison & Son, Ltd., to break tensil bars .564 diameter C.L., etc.—Address offers to T. E. ROWELL, F.C.A., 1, Northumberland Place, North Shields.

FOR SALE, two 5 ft. 6 in. Internal Diameter Cupolas, complete with staging, Electric Lift (400 v., 3-ph., 50 c.), and two "Alldays & Onions" Blowers, direct-coupled to 18-h.p. motor; installed but never worked, and now superseded. Offers are invited, and the Plant may be inspected at any time by appointment.—THOMAS L. HALE (TIPTON), LTD., Dudley Port, Tipton.

MACHINERY PLANT, &c., FOR SALE

PARKINSON No. 7A Sunderland Gear Generating Machine.

8 in. x 16 in. CHURCHILL Plain grinding Machine, with Gear-box Drive.

No. 1½ CINCINNATI Universal Tool and Cutter Grinder.

DIAMOND Surface-grinding Machine, with magnetic chuck 2 ft. 8 in. x 10½ in.; 12-in. stone.

Five-ton "Ransome & Rapier" LOCO. STEAM CRANE, 1917 make; 50-ft. jib; 4 ft. 8½ in. gauge; 8-ft. wheel base; 100 lbs. W.P.

Five-ton "Smith" LOCO. STEAM CRANE; 4 ft. 8½ in. gauge; 30-ft. steel jib; 7-ft. wheel base; two speeds, both double purchase; 80 lbs. W.P.

Two Dish-ended LANCASHIRE BOILERS, by Thompson; 30 ft. x 8 ft.; reinsure for 150 lbs. per square inch working pressure.

Two LANCASHIRE BOILERS, 30 ft. x 8 ft.; reinsure 110 lbs. pressure.

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11 ACRES WORKS SITE—SHEFFIELD. 145,000 sq. ft. of SHOPPING, compact and convenient. Siding connections with L.M. & S. and L. & N.E. Rlys. Well-built and commodious Offices. Will sell whole or in lots to suit customers, or let on favourable terms. Unique opportunity for manufacturers.

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MAUGHLIN PATTERN LETTERS AND FIGURES.—Die cast complete with pins in one piece, ready for fixing; no shellac required; simply drive them in and they will not come off; send for samples and prices.—A. LAKIN & SON, Totley Rise, Sheffield.

PATTERNS.—Inquiries solicited; quotations by return; shop equipped with modern machinery; quick delivery.—CLEGHORN & COMPANY, Midland Pattern Works, Spring Gardens, Worcester. 'Phone 264.

CHARCOAL.—Powdered, granulated, lump, blacking; inquiries invited.—J. BUCHANAN & COMPANY, Ashfield Road, Altrincham, Cheshire.

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MESSRS. REAVELL & CO., LTD., Ipswich, are prepared to quote for Small Castings required in large quantities which can be machine moulded, on receipt of drawings and specifications.

ERITH YELLOW LOAM and SAND
FINEST QUALITY.

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Foundry Supplies Dept.,
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Also
COKE and ALL FOUNDRY MATERIALS.

'Phone: 287 SLOUGH.

CRANE LADLES

½ TON (NEW), enclosed gear ..	£12
1 TON (NEW), enclosed gear ..	£20
3 TON EVANS, as new	£30
5 TON EVANS, as new	£36
8 TON EVANS, good	£40
10 TON STEVENSON, equal to new	£45
12 TON EVANS, equal to new ..	£65

All have Worm and Bevel Gear.

LARGEST STOCK OF FOUNDRY PLANT IN ENGLAND. PLEASE SEND FOR LISTS.

BUY FROM ME AND SAVE MONEY.

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